The Builder.

VOL. XXXI.—No. 1569.

The Strength of Building Materials.

SOME very useful information on the strength of materials employed in general building is given, *inter alia*, in Mr. Stoney's valuable book on the Strains in Girders.* The nature of the strains produced in all horizontal beams,—as bressummers, girders, joists, lintels, &c.,—is alike in all. It is compounded of compressive strains in the side immediately loaded and of tensile strains in the opposite side; while the strains produced in pillars, columns, and struts are wholly compressive, and in tie-rods and tie-beams wholly tensile, except that in some forms of structure and mode of loading struts and ties occasionally act in both ways, and in these cases require exceptional consideration.

Having ascertained by experiment the breaking weight of specimens of materials of known dimensions, the general custom is to take some sub-multiple of that weight as the safe load; as, for instance, where a bar of iron 1 in. square is found to break with a weight of 20 tons, it would be loaded with not more than, say, 5 tons, or one-fourth, as the working-load.

The crushing strength of timber varies with its condition of dryness, being not nearly so strong when wet as when dry. The crushing strength in pounds per square inch, when in its ordinary state, and when dry, is as follows, respectively:—Red deal, 5,748 and 6,586; white deal, 6,781 and 7,293; spruce fir, 6,499 and 6,819; mahogany, 8,198 and 8,198; Quebec oak, 4,231 and 5,982; English oak, 6,484 and 10,058; Pitch pine, 6,790 and 6,790; yellow pine, 5,375 and 5,445; red pine, 5,395 and 7,518; willow, 2,898 and 6,128. These experiments, having been made with selected specimens of small size, show results in general much greater than can be reckoned upon in practice with large scantlings, subject to the defects of knots, &c., and probably about half these weights per square inch would represent the real ultimate strength of the respective kinds of timber. The working load should be only a fraction of this strength. At the Landore Viaduct, constructed by the late Mr. Brunel of creosoted American pine, the timber was generally calculated to bear 373 lb. per square inch in compression, though in some parts of the structure the strain was allowed to reach 560 lb. At the Innoshannon lattice timber bridge, erected by Mr. Nixon, on the Cork and Bandon Railway, the ordinary working strain was 484 lb. in compression. In America, General Haupt has not considered it safe to assign more than 800 lb. per square inch as a permanent load; and in a paper read by Mr. Mosse, at the Institution of Civil Engineers, in 1863, it is stated that about 900 lb. per square inch are usually considered by American engineers to be the limit of safe compression for timber framing (pine is the timber here meant). "Navier and Morin, distinguished French authorities, recommend that the working strain of timber should not exceed one-tenth of the breaking strain, and, owing to its liability to decay, this rule seems safe practice for structures which are exposed to the weather; but when timber is under cover, one-eighth of the breaking strain is a safe working load. For merely temporary purposes, a strain of one-fourth of the breaking weight is probably safe, provided there are no shocks." The experiments, the results of which are given above, were made with short pieces, not more in height than twice the diameter. With long pillars, however, the case is different, owing to the liability to bend under loads approaching the safe compressive strain of the wood itself. The square is the strongest form of rectangular timber pillar. It appears from Hodgkinson's experiments, that the strength of long, round, or square timber pillars is nearly as the fourth power of the diameter or side divided by the square of the length. The late Professor Hodgkinson gave the following rules for the strength of timber pillars with both ends flat and well bedded, and whose lengths exceed thirty times the diameter:—

Let W = the breaking weight in tons.
l = the length of the pillar in feet.
d = the breadth in inches.

For long square pillars of dry Dantzic oak,

$$W = 10{\cdot}95\frac{d^4}{l^2}$$

For long square pillars of red deal (dry),

$$W = 7{\cdot}8\frac{d^4}{l^2}$$

For long square pillars of French oak (dry),

$$W = 6{\cdot}9\frac{d^4}{l^2}$$

When timber pillars are less than 30 diameters long, they come under the class of medium pillars, for which Mr. Hodgkinson devised the following formula:—

$$W' = \frac{W c}{W + \frac{3}{4} c.}$$

where W = the breaking weight in tons derived from the formula for long pillars, on the hypothesis that the pillar yields by flexure alone; c = the crushing weight of a short length of the pillar, *i.e.*, its sectional area multiplied into the crushing unit-strain of the material, in tons; and W' = the real breaking weight of the medium pillar, in tons, from the combined effects of flexure and crushing.

Pillars with flat ends, well bedded, are much stronger than pillars with round ends, or those imperfectly bedded. "In all long pillars of the same dimensions the resistence to fracture by flexure is about three times greater when the ends of the pillars are flat and firmly bedded, than when they are rounded and capable of turning." The strength of pillars with one end flat and the other rounded, is a mean between that of a pillar with both ends round and one with both ends flat.

The crushing strength of granite of various kinds has been found to be as follows:—Aberdeen (blue), 10,914 lb. per square inch; Peterhead, 8,263; Cornish, 6,356; Killiney, 10,780; Kingstown, 10,115; Blessington, 3,630; Ballyknocknan, 3,173; Newry, 13,440; Mount Sorrel, 12, 861.

The strength of Arbroath paving stone (sandstone) is 7,884 lb. per square inch; Caithness, 6,493 lb.; Dundee sandstone, 6,630; Craigleith white freestone, 5,487; Bramley Fall, near Leeds, 6,059; Derby grit, 3,142 and 4,345; Yorkshire paving, 5,714. Compact limestone, 7,713 lb. per square inch; black compact Limerick limestone, 8,855; Anglesea limestone, 7,579. Valencia slate, 10,943; Killaloe, on bed of strata, 26,495; the same on edge of strata, 15,225; Glanmore on bed of strata, 21,315; on edge, 12,740.

The ultimate strength of bricks to resist compression is set down as follows:—Pale red, 562 lb. per square inch; Red brick, 808 lb.; yellow-face baked Hammersmith paviors, 1,002 lb.; yellow-face burnt Hammersmith paviors, 1,441 lb.; Stourbridge fire-brick, 1,717 lb.; Buckley mountain brick, North Wales, 2,130 lb.; brickwork set in cement (the bricks not of a hard description), 521 lb. per square inch. For the purpose of comparing the strength of Portland cement bricks with that of common bricks, Mr. Grant made some experiments, which were as follow ("Minutes of Proceedings, Inst. C.E.," vol. xxxii.):—Gault clay brick, $8\frac{3}{4} \times 4\frac{1}{2} \times 2\frac{3}{4}$ bore a weight of 40·04 tons before crushing; a wire-cut brick of the same clay, $\frac{1}{4}$-in. longer than the last-named, 32·70 tons; a perforated gault clay brick, 9 in. long, $4\frac{1}{2}$ in. wide, $2\frac{1}{4}$ in. thick, 46·40 tons; Suffolk brimstones, $9 \times 4\frac{1}{4} \times 2\frac{1}{8}$, 34·94 tons; Stock brick, $9 \times 4\frac{1}{4} \times 2\frac{1}{8}$, 38·74 tons; Fareham red brick, $8\frac{3}{4} \times 4\frac{1}{4} \times 2\frac{1}{8}$, 90·40 tons; Staffordshire blue brick, pressed with frog, $8\frac{3}{4} \times 4\frac{1}{8} \times 2\frac{3}{4}$, 111·04 tons; the same kind of brick without the frog, 117·92 tons.

The late Professor Rankine considered the crushing strength of good coursed rubble masonry to be about four-tenths of that of the stone of which it is built. The resistance of common rubble to crushing is not much greater than that of the mortar which it contains. The following is the crushing strength of lime mortar, according to Rondelet, in pounds per square inch: Lime and river sand, 436 lb.; the same beaten, 596 lb.; lime and pit sand, 578 lb.; the same beaten, 800 lb.; cement and pounded tiles, 677 lb.; the same beaten, 929 lb.; these mortars were eighteen months old. Fifteen years later the experiments were repeated, when mortars of lime and sand were found to have increased in strength about one-eighth, and mortars of cement about one-fourth.

Some examples of the actual pressure sustained by stone and brick of various kinds are given, the greatest of which appears to be in the pillars of the church of All Saints at Angers, of Fourneaux stone, viz., 38·4 tons per square foot. The pillars of the dome of St. Peter's, at Rome, carry a weight equal to 14·9 tons per square foot, and are of calcareous tufa, called Travertin. The pillars of the dome of St. Paul's, London, of the oolitic limestone of Portland, carry 17·6 tons per square foot. A pillar in the Chapter-house of Elgin, of red sandstone, carries 17·9 tons per square foot. Red Birmingham bricks, in a viaduct in that town, set in lias-lime mortar, carry 7 tons per square foot. London paviors, set in mortar of 1 of cement to $2\frac{1}{2}$ of sand, in the Charing Cross railway bridge, carry 12 tons per square foot. Staffordshire blue bricks, set in Portland cement, in Clifton Suspension Bridge, 10 tons per square foot. Concrete made of 1 of Portland cement to 7 of Thames gravel, carries 8 tons per square foot in Charing Cross bridge.

Experiments on the crushing weight of cast-iron from sixteen localities showed a mean of 38·519 tons per square inch, the specimens experimented on being one diameter and two diameters high, an equal number of each. The weakest of these was 27·004 tons, and the strongest 49·109 tons. Another set of experiments on twenty-two different sorts of cast-iron showed a mean crushing weight of 37·6 tons per square inch; the weakest being 24·45 tons, and the strongest 51·78 tons. The strongest specimens were mixtures of different sorts of iron. Repeated meltings seem to have the effect of increasing the crushing strength, which may be said to be in general about 42 tons per square inch for mixtures, but for simple cast-iron to be somewhat less than 38 tons. In practice, however, these pressures seem never to be nearly approached. For instance, in the Severn Valley railway-bridge, carrying the Coalbrook-dale railway, 200 ft. span, and 20 ft. rise, the calculated working strain is between $2\frac{1}{2}$ and 3 tons per square inch. In the centre arch of Southwark Bridge, 240 ft. span, it is 2 tons per square inch. In subjecting wrought-iron to a compressive strain, its greater elasticity must be taken into

* The Theory of Strains in Girders and similar Structures. By Bindon B. Stoney, M.A., M. Inst. C.E. New edition. Longmans, Green, & Co. 1873.

account. Ordinary wrought-iron is completely crushed, *i.e.*, bulged, with a pressure of from 16 to 20 tons per square inch, and the point at which compressive set sensibly commences, that is, the limit of compressive elasticity, is about 12 tons per square inch.

The tensile strength, on the other hand, is greater in wrought than in cast iron. The mean tensile strength of twenty-seven sorts of cast-iron was 7 tons, the weakest being 5·667 tons, and the strongest 10·477; whereas Mr. Kirkaldy found the mean tensile strength of 188 rolled bars to be 25¾ tons per square inch; of 72 angle irons and straps, 24½; of 167 plates lengthwise, 22·65 tons, and of 160 plates crosswise 20·6 tons. Timber is put to better use when so placed as to receive a compressive strain in the direction of its fibre than when employed as a tie; nevertheless, as it is sometimes used for this purpose, a few examples of its tenacity may be quoted. Christiana deal is set down as having a tensile strength of 12,900 lb. per square inch; elm, 14,400 lb.; fir, 12,000 lb.; mahogany, 8,000 lb., according to Barlow, but according to Bevan much more; English oak, 10,000 lb.; pitch pine, 7,650 lb.; Norway pine, 7,287 lb. to 14,300 lb.; Petersburg pine, 13,300 lb.; teak, 15,000 lb. These are lengthwise of the grain, but in tearing the fibres asunder crosswise, the following numbers are given, in pounds per square inch. Memel fir from 540 lb. to 840 lb.; Scotch fir, 562 lb.; larch, 970 lb. to 1,700 lb.; oak, 2,316 lb.

As stone is rarely employed in direct tension there are but few experiments on its tensile strength, but the following are given of some Scotch stones, viz., Arbroath paving, 1,261 lb. per square inch; Caithness, 1,054 lb.; Craigleith, 453 lb.; Hailes, 336 lb.; Humbie, 283 lb.; Binnie, 279 lb.; Redhall, 326 lb.; Whinstone, 1,469 lb. The tensile strength of mortar is more often useful, and is as follows, according to M. Vicat:—Mortar of quartzose sand, and eminently hydraulic lime, well made, 136 lb. per square inch; of quartzose sand and ordinary hydraulic lime, well made, 85 lb.; of quartzose sand and ordinary lime, well made, 51 lb.; mortar, badly made, 21 lb.

When a beam projects from a wall, and is loaded, either at the extremity or uniformly over its length, the upper edge is extended and the lower edge compressed. This projecting beam may be called a semi-girder. The relative strength of beams or girders is proportional to the breadth, to the square of the depth, and inversely proportional to the length; or in other words, it is proportional to the cross-sectional area multiplied into the depth, and divided by the length. The absolute strength varies with the material, and is determined for each kind of material by experiments, from which are deduced from each the co-efficient of rupture, S.

When a semi-girder is loaded at the extremity $W=\frac{a\,d\,S}{l}$, and $S=\frac{l\,W}{a\,d}$, in which W = the breaking weight, a the sectional area, d the depth, and l the length, S being the constant determined for each material, by finding experimentally the breaking weight of a girder of known dimensions, and similar in section to that of which the strength is required. For small rectangular cast-iron bars, not exceeding 1 in. in width, S = 3·40 tons. For large rectangular cast-iron bars, say 3 in. wide, S = 2·25 tons.

For Christiana deal S = 1,562 lb.; English elm, 782 lb.; Canada rock elm, 1,970 lb.; Mar Forest fir, 1,232 lb.; spruce fir, 1,346 lb.; American hickory, 2,129 lb.; Australian iron-bark, 2,288 lb.; Norway spar, 1,474 lb.; African oak, 2,523 lb.; Dantzic oak, 1,518 lb.; English oak, 1,694 lb.; American red pine, 1,527 lb.; pitch pine, 1,727 lb.; American white pine, 1,229 lb.; American yellow pine, 1,185 lb.; Dantzic pine, 1,426 lb.; Memel pine, 1,348 lb.; Riga pine, 1,383 lb.; teak, 2,108 lb.; South African sneezewood, 3,305 lb.

The foregoing values of S for timber are derived from selected samples, of small scantling, perfectly free from knots and other imperfections that cannot be avoided in large timber, and the few experiments recorded on balks of large size indicate that the values of S must be reduced to nearly half (·54 times) those given above.

By mechanical reasoning, as well as by experiment, it is found that beams will carry various weights, the dimensions being the same, according to the manner in which they are loaded, *e.g.*, for a semi-girder, loaded uniformly, $W=\frac{2\,a\,d\,S}{l}$.

For a girder supported at both ends, and loaded at the centre, $W=\frac{4\,a\,d\,S}{l}$.

For a girder supported at both ends, and loaded uniformly, $W=\frac{8\,a\,d\,S}{l}$.

For a girder supported at both ends, and loaded at an intermediate point, the segments of the length being called m and n respectively, and $m+n$ being equal to l, $W=\frac{a\,d\,l\,S}{m\,n}$.

It is often very useful to know the transverse strength of stone. The author gives the following values of S for several kinds. Of granite, the following:—Ballyknocken, co. Wicklow, 109 lb.; Golden Hill, Blessington, 76 lb.; Killiney, co. Dublin, 270 lb.; Kingstown, co. Dublin, 346 lb.; Newry, co. Down, 340 lb.; Taylor's Hill, Galway, 407 lb.

Of sandstones and grits:—Green-moor, Yorkshire, blue stone, 335 lb.; white stone of the same locality, 359 lb.; Caithness stone, 857 lb. Of limestone from Listowel quarry, co. Kerry, 414 lb.; Ballyduff, King's county, 351 lb.; Woodbine quarry, co. Kildare, 283 lb.; Finglass quarry, co. Dublin, 291 lb.

Valencia slate on edge of strata, 1,091 lb.; the same on bed of strata, 951 lb.; Glanmore, co. Wicklow, on bed of strata, 1,097 lb.; Killaloe, Tipperary, on bed of strata, 1,233 lb.; Welsh slate, 1,961 lb.

The strengths of the Irish stones are taken chiefly from Mr. Wilkinson's experiments, which were made on stones 3 in. square and 12 in. clear length of bearing, the pressure being applied on the middle of the length.

The working strain put upon any material, compared with its ultimate strength, must be regarded in connexion with the nature of the material: the more fibrous the material, the nearer may the working load approach the ultimate strength, within the limits of convenience in respect of bending.

THE COAL AND GRATE QUESTION.

A GENERAL satisfaction has been felt at the appointment of a Parliamentary Committee to investigate the causes of the present scarcity and dearness of coal. Although a committee of the House of Commons is far from being the best conceivable tribunal for the prosecution of such an inquiry, it is certainly the best practicable one, in the existing state of things. It is, moreover, a kind of court that posseses advantages peculiar to itself. Its great defect is, that it is destitute of a judge; the chairman having no such pre-eminence over his colleagues as to invest him with the unquestioned dignity of a judicial president. The advantage is, that the members unite the functions of counsel and of jury men. In all important questions it is customary to select the members of a committee, not from disinterested, but from differently-interested parties. The proper balance is thus maintained. Each member, putting questions intended to elicit support for his own views, practically cross-examines every witness other than those whom he invites to come forward. Out of this conflict a considerable degree of light and truth is usually elicited. It is true that if we consider the report of the committee as the out-come of their labours, we shall usually find ourselves disappointed. The inferences in which all the members agree are generally so few as to give but a meagre aspect to the statement. The want of an independent president makes the report a mere matter of compromise. But any such results thus arrived at have the weight of something like admitted and proved truth. And, in any case, the evidence laid before the public is a source of positive information to the student of politics; while the ventilation, from day to day, of opposite views, and the revelation of unsuspected facts, tend to guide both opinion and legislation in the right channel.

We may thus expect from Mr. Mundella's committee a report, or at all events a publication, of a very different value from that of the Royal Commission on Coal. We cannot, in justice, attribute to the optimist and unpractical report of that Commission any of the disturbance which has taken place, as if in ironical comment on their work. But there can be no doubt that that inquiry, if it had been carried out with due ability, might have done much to prepare us for our present distress, and so far, to aid us to meet it. As to that, however, we have said enough. The matter now in hand is, to consider how the inquiries of the present committee may be so guided as to produce the quickest, the surest, and the most exhaustive result.

We must refer (not as matter of literary criticism, but with a view to avoid misleading fallacy) to the mode in which "the great law of supply and demand" is invoked with a kind of religious reverence, not so much by the speakers in the House of Commons, as by the speakers as represented in the newspapers. That the hon. mover should say he had no wish to induce the House to interfere with the usual course of business in this country, is only plain good sense. That "Parliament should in no way interfere with the production of coal," which was the assumption of the Home Secretary, is a very different statement. Parliament has interfered with that subject again and again. No later than the 1st of January, 1873, a measure came into operation which very considerably interferes with that production—whether advantageously or disadvantageously. The question of an export duty, which has before this received the warm advocacy of the present Prime Minister, is one that will have to be discussed by the committee; and to assume that Parliament can, should, and will do nothing in the matter, is as helpless a piece of innocence as to assert that Parliament can control prices altogether.

It is of essential importance, in a matter that comes home to the fireside of every one of us, to avoid unmeaning phraseology. Speakers and writers may think it harmless to pay a sort of fetish worship to what they suppose are generally admitted and mysterious "laws." They thus guard themselves, they may think, from having their foundations undermined by people who understand a subject of which they have only a very hazy perception. But they do great harm, nevertheless. By admitting the force of phrases which they do not altogether understand, men help to form such phrases into fetters of the intelligence. The real fact is, that the true laws, or incontestable principles, of economical science, are excessively general and abstract. They are little more than truisms, couched in more or less scientific, or often only pretentious, language. They have practical effect only inasmuch as men are guided by one out of many motives of human conduct. Mr. J. S. Mill, who has laboured more than most men to erect political economy into a science, plainly and honestly states, in the first volume of his "Principles of Political Economy," that it is only on the hypothesis that production and price are *exclusively regulated by competition*, that his favourite theory has *any pretensions to the title of a science*. Where custom rules, instead of competition, he admits that his reasoning is inapplicable. It cannot be too carefully borne in mind that such is the case. Much human action is regulated almost entirely by custom. Into all such action custom, or other moral influence, enters very largely. Competition, on the other hand, is never found to be the sole principle in activity; unless it be at an auction. Whatever truth, then, exists in the dogmas of the political economist, or rather whatever may be the clearness and pointed wisdom with which he applies known principles to the conduct of business,—value, regulated by unchecked competition, is but one out of many causes which have to be regarded. We shall view the labours of the Committee with more hope, the less they say about the "great law of supply and demand," and the more they apply themselves to discover how it is that, in the pinching cold of this late winter, the demand for fuel far outruns the supply.

The first practical lesson, however, which each one of us may draw from an event that has brought discomfort to almost all, alarm to the thoughtful, and disease and death to not a few, is, how to avoid our own daily waste of a mineral now felt to be so precious. Our domestic consumption of coal, in the year 1869, was 18 million tons. Considering that we are now in the midst of the winter half-year, we can hardly estimate the cost to which the consumer (for domestic use) has already been put at less than 4½ millions sterling. If the present price of coal is not materially abated the householders of Great Britain will have paid at least 9 millions sterling more for coals in 1873 than they did in 1872. The average consumption of coal per head of the population, taking the latter approximately at 31½ millions, is 0·57 of a ton (nearly sixth-tenths of a ton) per annum. For the population of the metropolitan district this

gives a consumption hard upon 2 millions of tons of coal for domestic use alone. We suppose that there are few among them who would not rejoice at the idea of being able to buy all their coal for 1873 at an advance of only 20s. per ton on the price they paid in 1872. Here is, in one item, a tax of 2 millions a year on the metropolis. And even this, large as it is, is, as we shall presently show, but a part of the actual increase of expenditure caused to the Londoners by the disturbance in the coal trade.

We have confined our view to the metropolis alone, because it enables us to place before our readers figures which, although only approximate, are sufficiently correct to allow us to form a very distinct idea of the practical bearing of the subject. Now we suppose that no engineer,—we might almost say no cultivated man who has ever travelled in Northern Europe,—can doubt that all the comfort and advantage that have been ministered to the 3½ millions of Londoners by their consumption of 2 millions of tons of coal might have been secured, by an economical method of consumption, by the use of a third of that quantity. Let us consider price to be doubled, and consumption reduced to one-third, and we have a clear gain of two-thirds of the original outlay. Thus, instead of 2 millions of tons London should, say in 1874, consume 666,000 tons, the price having risen from 20s. per ton to 40s. per ton, the cost would be 1½ million sterling as against 2 millions in 1872, and 4 millions in 1874.

We are not about to use so magnificent an opportunity for recommending the use of any particular description of stove. We have little doubt that the manufacturers, the retail tradesmen, and the advertisers will rise to the level of the occasion. But we would ask any one who is familiar with the ordinary stoves in use in so many parts of the Continent, whether he will be contented, coal being as it is, to forego the introduction of so manifest an element of economy, as well as of cleanliness and comfort? Will he continue, for the sake of habitual prejudice in favour of the open fire, to pay 60*l.* a year instead of 20*l.*? The iron stoves which are not uncommonly to be met with among us have serious disadvantages, especially in the unpleasant result of bringing the air we have to breathe into direct contact with heated iron. But this does not apply to stoves covered with, or composed of, earthenware. The latter may be made highly ornamental embellishments for a room. In the ceramic gallery of the South Kensington Museum may be seen specimens of the application of the potter's art to what may well be called the focus of domestic life.

One point has to be borne in mind with regard to that introduction of earthenware stoves which can only be a question of time. A struggle will ensue between economy and health. The former will induce us to save heat, at the expense of ventilation. The latter calls on us to ventilate, whatever may be the loss of temperature. The misfortune of the case is, that, hitherto, economy has carried the day. It has done so, not solely by its own force, but because it has afforded the greater amount of *sensible* comfort to most people. Cold is felt by every one, especially when engaged in sedentary occupations. The oppression which air, vitiated by human respiration, exerts on the lungs, is, comparatively speaking, felt by few. But almost every Englishman or Englishwoman is sensible of this oppression on going into many a stove-warmed house. Let us take the bright little miniature of Paris, the city of Brussels, for an example. It is some years since we were there; but we doubt not that the experience of the traveller of to-day is the same as our own. On entering one of the clean and comfortable hotels of Brussels or of Ghent, with its noble and lofty apartments, large and well-glazed windows, and all the stately furniture that befits a palace, we become very sensible of the confined air of the place. The house has been shut up for the winter! Cold is kept out, but, with it, fresh air is excluded. An imperceptible,—no, a perceptible,—presence; a sort of faint, ghostly reminiscence of eaten dinners, and smoked pipes, and emptied bottles, and extinguished matches, and performed household duties of every description, comes to meet us as we enter. We must not let our economy of coal afflict us with such an atmosphere as that.

There is no reason why it should. The actual consumption of fuel will be regulated by the amount of air that passes through the fire-grate But that quantity, in nine cases out of ten, is utterly inadequate to the due ventilation of the apartment. Now the economy effected, in the case of the closed apartment, is twofold. First, there is the diminished consumption of fuel; secondly, there is the prevention of the escape of radiant heat. It is the latter alone that involves contamination of the atmosphere. Nor is the economy of this part of the system more than a small portion of the total saving. Be it less or more, it is a false economy. Everything that calls on the human organisation to perform a destructive function, which can be avoided by the use of mechanical means, is a thoroughly false economy. But even with our wasteful open fires we are not in a position to be very severe on our more thrifty neighbours in this respect. An open grate, within twelve or fourteen inches of the floor, is but a very imperfect ventilator. If the apartment be lofty, it will never be properly ventilated by such a grate, unless doors or windows are occasionally thrown open, and a thorough ventilation, a storm on a small scale, be from time to time introduced. It is only by special openings for ventilation in the top of the room that due sweetness of air can be otherwise insured. We have often spoken on this subject. Such an arrangement is admitted by all the more thoughtful and conscientious architects to be indispensable. The use of earthenware pipes for the express purpose of ventilation, and never employed as smoke-channels, has been known among us for many years. It has often been recommended in our pages, and is, we believe, slowly making its way into general use.

The introduction of this wise sanitary precaution should be the constant accompaniment of that of the earthenware stove. We must not bottle up de-oxygenised air because it is warm. Means will probably be found, sooner or later, of extracting the saline from deteriorated air, while in the process of removal from our apartments. We cannot afford to wait for that. We have to guard against running from one extreme to another. We shall, we have little doubt, effect a very great saving in our domestic consumption. But do not let us increase the doctor's bill at the expense of the coal merchant, or injure our lungs while we improve our grates.

We have naturally been led to dwell on that part of this great subject which most directly concerns the practice of the architect and of the builder, and which most sharply and constantly comes home to our daily perception. But, economically speaking, we have touched on the smallest element in a great national question. The domestic supply of coal is not a sixth part of the total supply, and a fact of which we are only beginning to find out the pressure has yet to be fully elucidated. The price of coal is not only an element in the cost of all manufactured articles, but it is an element that has to be taken into account over, and over, and over again.

We require coal to work the engine that raises coal from the mine. Then we require it to move the locomotive that takes the coal to the wharf. Again it is required to raise the iron ore, and the lime-stone flux to be used in smelting; to heat the furnace of the smelter, to blow his fans, to raise the proportioned contents of his furnace. We require more coal to run the iron from the cupola; to heat the puddling-furnace; to heat, hammer, or roll the puddled bars into bar or sheet. The engineer, the merchant, the blacksmith, the cutler, the workman in iron in any form, each requires a new heat and a new supply of coal. Fresh locomotive power is needed to send the manufactured article into the market; and what have we then? A tool with which a man may begin to work! How the price of a hammer, a chisel, or a saw may be increased by the action of the one item of costly fuel, over and over again recurring in these various processes, besides acting directly on the cost of labour, in the matter of the daily consumption of the workman, it is not easy to foresee; but it is clear that Mr. Ball does not overstate the matter when he says that the very existence of England as a great nation depends on the price of her coal supply.

There is no doubt that the actual rise in the price of coal is not to be accounted for on economical grounds. Political economy takes no heed of panic, or rather it takes heed of it as it does of death itself, as a stern element in the restriction of what it calls over-production and over-population. Into that we cannot now enter. But it is important to bear in mind that the actual rise must be referred to moral causes alone, not to physical or to mechanical causes. We very much question whether the demonstration which we offered, that the depth of workable coal must be limited by the distance of 2,000 ft. rather than of 4,000 ft., from the surface, if it were present to the mind of every coal-owner and of every collier, would have raised the price of coal a single penny per ton.

But the fact is, in the first place, that the constant yearly augmentation in the demand for coal, which, as we pointed out, would, if maintained, have exhausted all our *certain* supplies within a century, has approached unmanagable proportions. Sir W. Armstrong speaks of the great activity of the iron trade. This, no doubt, is one great element in the case; but all the elements of increased demand are represented in the one figure of constant annual increase of coal produced. This, we repeat, is becoming unmanageable, involving, as it does, the conditions and the demands of so many coal-fed industries.

Entirely distinct in its essence from this case, although taking occasion from its activity, is the labour question. The prime element here has been the disposition which party strife has so unfortunately developed, to treat industrial questions on non-industrial principles. Men have heard so much of political economy that many of them have begun to think that politics (in the vulgar and erroneous sense of the word) is the true economy. The workman has been taught that his best tool, in order to better his condition, is not the hammer or the pick, but the vote. If he has learnt this lesson rather too aptly it is not so much himself as the inculcators of this new gospel that are to be blamed. Taught, by every teacher to whom he can look, the doctrine (false, except in a very abstract sense) that labour is limited by capital, the workman has not unnaturally come to the conclusion that capital is the great enemy of labour. Thus we have found him advised and induced (as in the case of the double shift) to neglect that which was to his own manifest advantage, on the sole ground that it was also to the manifest advantage of the person denounced as the capitalist.

Thirdly, we have the usual influence of panic—an influence causing a rapid and energetic action, and calling into play every degree of motive, from prudence to rascality. For a rise of 8s. per ton at the pit's mouth, to be accompanied by a rise of 30s. per ton at the hall-door, is an anomaly that can only be transitory. It is in this last, and, indeed, most pressing point of the case, that the most advantage is to be expected from the labours of the committee. The honourable mover stated that the very commencement of the motion caused a decline in the price of coals. It is by no means inconsistent with the known facts of financial panic to suppose this to be the case. The knowledge that the subject is about to receive full attention, will tranquillise many minds. In panic, every mind tranquillised is a subtraction from the violence of the disturbing force.

Thus, we can hardly doubt, the committee will render excellent service by bringing into full light many of the elements that will come in to reduce the price of coal. Such are that decrease of waste in use to which we have referred, in one branch alone; the possible effect of export duty; the influx of foreign workmen; the application to collieries of labour disengaged elsewhere; the application of coal-cutting machinery; and the importation of coal from the most accessible portions of the enormous foreign supply, compared to which our own stores of the mineral are only fractional. In presence of these and similar considerations, we hesitate to believe that anything like present prices can be maintained. Should such prove to be the case, it cannot fail to paralyse the manufacturing and commercial activity of the country. Over-dear coal would then right itself with a vengeance; and the "great law of supply and demand" would produce one of those violent and fatal oscillations which it is the duty of the statesman to avert.

The German Gymnastic Society.—The twelfth annual report of this Society notes a satisfactory progress in all its branches during the year 1872. It is proposed to build another story on the top of the present club-room, towards which the following gentlemen have subscribed:—Mr. C. W. Siemens, 400*l.*; Baron H. Schroeder, 100*l.*; Messrs. Fruhling & Goschen, 100*l.*; Messrs. Frederick Huth & Co., 100*l.*; subscribed and promised by members, 300*l.* The object is to get a lecture-room, a reading-room, and some smaller rooms, comfortably and suitably fitted up; cost estimated at about 1,500*l.*

EXHIBITION OF THE ROYAL SCOTTISH ACADEMY.

THE first thing which strikes the eye upon entering the Academy galleries this year is the effectiveness of the *tout ensemble*. The hanging committee seem to have not only been desirous to place the pictures where they could best be seen, but also to arrange them in such a manner as to produce a good general effect. The first room is entirely occupied by water-colour drawings, the examination of which accustoms the sight to sustain and endure the stronger colouring of the oil paintings. Upon passing the screen which divides this room from the others, a long perspective is seen, terminating in a row of busts, the cold, white gleam of which enhances the warmth of colouring pervading the rest of the apartments. This effect has been obtained by removing a screen which formerly cut off the view of the sculpture-room.

As regards the works exhibited for the first time, we cannot say that much high art,—really intellectual work, which will live and be prized by future ages,—is to be found. Some of those already familiar to the public do possess very high qualities. Faed's "From Dawn to Sunset" is "a thing of beauty, a joy for ever,"—a poem of the artist's own composing as fine in its way as Shakspeare's Seven Ages.

Millais's "Chill October" also adds its attractions to the exhibition. The artist, in this instance, diverges from his former practice of painting figure subjects; and his example has been followed by G. Paul Chalmers, whose "End of the Harvest" hangs opposite; and no two works could form a greater contrast. Millais has made colour a means towards an end, and has produced a veritable transcript of nature. In looking at the painting, the spectator does not think of the painter: the work is entirely devoid of mannerism. Chalmers has made his subject an occasion for the display of colour: that sombre, rich tone which pervades his interiors is here reproduced in the open air. The scene represented is a potato-field, with workers filling bags with the esculent roots. The sun is low down in the west, and a clump of leafless trees throws a dark shadow over the greater part of the foreground,—so dark, indeed, as at first sight to make it difficult to distinguish between the bags of potatoes and the labourers. The picture is a fine one of its kind, but we would have liked a little more light thrown into it. The repetition of the same effect in every kind of subject is sure to degenerate into mannerism.

In Sir George Harvey's "Thrieve Castle" we have much the same open-daylight effect as in "Chill October," but we cannot here disassociate the work from the worker: the means by which the effect is produced are transparent. The result, however, is very pleasing.

The "Interview between Jeannie and Effie Deans" in prison is rendered with truthfulness and simplicity by Mr. Robert Herdman. The characters of the two sisters are nicely discriminated: both in appearance and manner they are such as described by Sir Walter. The action is natural and unaffected, and the colour and composition remarkably good. Sir Noel Paton enters appearance with a Scripture subject,—"Christ and the Sleeping Disciples." The painting is more solid and the colour deeper in tone than is usual with the artist. The drawing and composition are graceful, but we cannot say that any religious feeling was awakened in us by the contemplation of this picture.

Mr. Mactaggart has again been at the sea-side, where he is quite at home. He has a free style of his own, entirely devoid of conventionality, the natural outcome of an independent mind. His best work is, we think, that entitled "Amongst the Bent," where we have a fine breezy stretch of sandy bay, with hillocks topped by tufts of bent, amongst which ruddy, happy children tumble about, free from woe or care.

Mr. Hugh Cameron continues to produce little gems,—gems they are, and pretend to be nothing else,—bits of lovely colour, delightful to look upon, but not all alike. "The Camellia" has the soft, lambent light of the opal; "Going to the Well" the paler lustre of the pearl.

Mr. W. F. Hole represents "Chivalry" in its best aspect. A knight on horseback is crossing a stream, having seated in front of him an old woman with a basket of eggs; to her he pays as much attention as if she were the fairest lady in the land. A princess and her attendant, strolling on the river's bank, look on with wonder, whilst a dwarf minstrel strums his guitar as an accompaniment to a ditty upon the action of the knight.

In "Osteria," by Mr. Keely Halswell, we have pleasantly represented one of those picturesque quadrangles found in Spain, the rich costume of the people, who stand in groups flirting and otherwise amusing themselves, giving animation to the scene.

"The Entrance to Curaig Skye" (Waller H. Paton) is one of the most wonderful scenes in the British Isles. The artist's point of view is from between two almost perpendicular masses of rugged rock, which rise up higher than the canvas; between these stands, clear against the sky, a huge "needle," while in the distance are gleams of water. Here, if anywhere, the artist might have been expected to abandon his usual trappings of purple and gold and array himself in simple gray and brown, but he has not done so,—he must everywhere appear *en règle*. Very different is "The Mountain Torrent," of Peter Graham: down the distant mountain side the gleaming streams tear along from amongst wreaths of mist to meet in one torrent of brown water, which breaks in spray over a rocky channel. This is the true spirit of the land of Ossian. We are not altogether satisfied with the delineation of the mist, however, which in parts appears too solid and immovable.

"The Clansman's Grave," by Mr. John McWhirter, and "Danottar," by Mr. W. E. Lockhart, are each fine renderings of the scenery of Scotland. Mr. James Drummond does not appear to have much of the comic element in his composition, yet he has produced a picture called "Rosinante" which is really comical. The gaunt, raw-boned charger of the redoubtable knight of La Manca, which, like its master, had some breeding in it, is represented as a short-legged, spiritless, pot-bellied brute, and whether the figure in the background is the knight himself or his squire it is difficult to say.

The number of portraits exhibited is unusual, and why most of them were admitted, except to fill up wall-space, it is difficult to say. One remarkably fine portrait, however, is, by G. P. Chalmers, of an aged divine, fine in expression and remarkably good in colour and texture.

A perusal of the great mass of the works exhibited leads to the conclusion that too many pursue the art of painting by striving merely to attain manipulative skill, the cultivation of the mind being entirely neglected, resulting in a paucity of ideas melancholy to contemplate.

The architectural works will be mentioned in our next.

MONEY TO BE SPENT BY THE LONDON AND NORTH-WESTERN RAILWAY COMPANY.

THE half-yearly meetings which are now being held by the several railway companies throughout the country disclose, amongst other facts, the remarkable expenditure which the different companies feel themselves compelled to incur in new works and station buildings, for the purpose of providing for their constantly increasing traffic. The outlay in this respect of many of the leading companies is something enormous, if not actually unprecedented. The proceedings at the meeting of the London & North-Western Company, held on Saturday last, show the marvellous expansion and resources of this powerful railway corporation. At the meeting in question the directors asked for, and obtained from the shareholders, a vote of no less than 818,416*l.* for additional rolling stock and new works. The particulars of the expenditure for which this enormous sum of upwards of three-quarters of a million sterling is required, will be interesting. A considerable portion of the amount is to be expended in additional rolling-stock, 295,000*l.* out of the entire sum voted being required for new engines, carriages, and wagons. There is then the sum of 285,297*l.* for extensive new works at several of the principal towns and districts intersected by the line, such works being for the most part now in progress. These works include 25,000*l.* for a coal station at Curtain-road, in the City; 9,000*l.* for the extension of roofing and other improvements at the Euston Station; 50,000*l.* for the extension of the Wapping goods station at Liverpool; 11,000*l.* for machinery for the goods station at London-road, Manchester; 41,000*l.* for the widening of tunnels on the Bettws and Festiniog line in Wales; 12,000*l.* for a double line on the Llandudno branch; 25,000*l.* for increased goods accommodation at Chester; 35,000*l.* for additional block telegraphs; 12,000*l.* for widening the line at Preston; and 64,750*l.* for additional shops and sidings at the Crewe works, where the company's engines, carriages, and wagons are chiefly manufactured. Beyond these amounts, 99,730*l.* have been granted for enlarging and providing additional accommodation at sixty-six of the company's passenger stations in different parts of the country, whilst 138,389*l.* have also been voted for the purchase of additional lands in twenty-eight different localities for still further extensions, bringing the aggregate sum voted for new works alone, irrespective of the intended outlay on new rolling-stock, to 523,416*l.*, or upwards of half a million sterling.

It may further be observed that these several large sums are altogether independent of a heavy outlay now being incurred in other new works along the company's lines, including the widening of the railway between London and Bletchley, which, besides the removal of a large quantity of earthwork, and extension of bridges and viaducts involves the construction of three new tunnels at Watford, Northchurch, and Leighton, containing an aggregate length of 2,632 yards. Simultaneously with the works just named the main line between Stafford and Crewe is being widened by two additional lines, requiring, as the engineer states in his report, the removal of 640,000 cubic yards of earthwork, and the construction of fifty-five bridges. A large new dock, at Garston, near Liverpool, is also in course of construction for the company; together with warehouses at the Canada dock station at Liverpool, and at the Egerton dock at Birkenhead, in addition to other minor works. The above all refer to works in progress; but beyond these it should be stated that the company are applying to Parliament for still further extensive powers, including the enlargement of the Lime-street passenger station at Liverpool, at an estimated cost of between 250,000*l.* and 300,000*l.* It may therefore be safely assumed that the company are now engaged in new works, present and prospective, involving an outlay of not less than 1,500,000*l.*

THE SANITARY MOVEMENT IN DUBLIN.

IT is now a well-established fact, that Dublin has at length awakened to the knowledge of her own deficiency in a sanitary point of view. To some extent the public of Dublin were under the belief that the action which caused the removal of numbers of manure-heaps and other nuisances that were somewhat ostentatiously reported, from time to time, was effected by the constituted authorities.

There are, however, good grounds for supposition that such was not the case; and it would appear that the true agent at work has been merely the demands of the market, or in other words, that as Dublin is bounded in some directions by highly valuable tillage lands, it is only at certain seasons that the cleansing processes referred to are carried out.

There would appear to be some grounds also for the comparative impunity with which nuisance-mongering is carried on in many of the city districts, in the delays of the law, in compelling offenders to consider their neighbours as well often as themselves, as well as their unwholesome trade.

Close proximity to the cow-shed, the stable, and the piggery, as well as manure-heap, gleaned from these and other even more objectionable sources, too often tells on the very poor who live near; but our knowledge of such cases enables us to bring to mind very many well-to-do people who sometimes in their own persons, but oftener still in those of their offspring, suffer from illness engendered, as it would appear, by this odorous state of matters.

Epidemical and endemical disease too frequently and too constantly compels attention to the state of Dublin, as seen in the high rate of sickness and of mortality, especially when taken in regard to the proportion of the population per acre in the Dublin registration district.

Another reason why the matter demands imperial inquiry, and as authoritative remedial measures, is the fact, that the birth-rate which sometimes actually falls below the death-rate, has for several years past actually very little exceeded the latter.

Here is an explanation of the fact that Dublin, unlike every large city in the United Kingdom, as we believe, has actually fallen off in population, although embracing within its registration bounds several flourishing seaside and rural townships.

This year another thriving suburban district has been added to the Dublin district. We would remind the executive that inquiry should be had, and then large measures possibly might be considered advisable; for we should never forget that not only is physical decay injurious to the well-being of a town, and even destructive to a nation if general, but a people's moral state may become a national burden as well as disgrace through neglect of their sanitary condition.

It is a matter of great importance to Dublin, that such questions as we have now glanced at have been taken up by several of the citizens, as well as by the Dublin University, and the Royal Dublin Society, and the movement has already met with a response also on the part of the Dublin Municipal authorities.

The Dublin Sanitary Association, now a few months old, numbers in its ranks many lay as well as professional men of standing, energy, and ability. It has already conferred with the corporation, and with the Public Health Committee of that body; and we trust that these conferences will result in improved efficiency and energy, by a competent staff of medical and lay officers, in the carrying out of measures of sanitary relief for the people of Dublin.

In concert, too, with the Royal Dublin Society, whose usefulness dates back to nearly a century and a half—the Dublin Sanitary Association, and the Council of the Dublin Society, have commenced a series of public lectures, in the theatre of Leinster House, on the several departments of Sanitary cure. The first lecture was delivered on Saturday last (22nd February), to a large and influential audience.

NEW RAILWAYS AND TRAMWAYS.

THE railway and canal Bills of the current session for which notices of petitions have been deposited are 190 in number, of which 160 are for the construction of new railways or additional railway works. Of the total number, seventy-seven Bills are promoted by new companies, and 113 by existing companies. The powers asked for are for the construction of 1,812 miles of new lines, and the proposed additional capital to be raised under the Bills amounts to 69,094,778*l.*, two-thirds of that amount being by shares and the remainder by loan. Eighteen tramway Bills have been petitioned for, to lay seventy-eight miles of tramway, capital in shares and loan, 837,800*l.* In addition to the latter, there are twenty-seven applications for provisional orders for the construction of 158 miles of tramway; capital, 837,012*l.* Of the new tramways, seventy miles are proposed to be laid in London and its suburbs, exclusive of the mileage in the four Bills that were suspended last July by order of the House of Commons.

The streets and roads in which it is proposed to lay tramways include:—A Brixton, Streatham, and Croydon line of seven miles and a half; lines from Blackheath-hill to Eltham, with a branch along the Lewisham-road; lines in Dover-road, Kennington-road, and Wandsworth-road; lines in Victoria-street, Westminster, and from the south end of Westminster Bridge, along the bridge, and the Thames Embankment to General Outram's statue; from Somerset House along Waterloo Bridge and Waterloo-road to a junction with tramways at the Borough-road; from London Bridge along Southwark-street, over Blackfriars Bridge along Bridge-street, Farringdon-street, King's Cross-road, and the Caledonian-road to Holloway, with branches in the City by Queen Victoria-street to the Mansion House, and from the Ludgate-circus by the new street to Holborn; an extension from Goswell-road to St. Martin's-le-Grand; a short line in Lothbury and along the west side of the Bank; an extension of the Whitechapel line to the junction of Leadenhall-street with Fenchurch-street, an extension from Old-street-road to Bishopsgate-street, and a short line from Moorgate-street to Broad-street Station. To the west and south-west tramways are proposed from Shepherd's Bush, along the Uxbridge-road, to Acton, Ealing, Hanwell, and Southall, with a branch to Brentford, and from Hammersmith, to Chiswick, Kew, and Richmond. Another line is proposed from Knightsbridge, along the Brompton and New Brompton roads, to Walham Green and Fulham. On the north and north-west, lines are proposed from Stamford-hill to Tottenham and Edmonton; lines in the Victoria Park-road and Grove-street; in the Junction-road, Upper Holloway; and from the Hampstead-road to the Adelaide-road, Haverstock-hill. One of the longest of the new routes is proposed by the London Street Tramways Company, and the Common Road Conveyance Company, being from Goswell-road, along Pentonville-road, Euston-road, Marylebone-road, and Edgware-road, to Edgware, with a branch from Oxford-street, along Tottenham-court-road, to Euston-road. Some of these applications ought certainly not to be granted.

The tramway companies, judging from their estimates, execute their works at excessive cost. One of the new bills, for instance, is for laying 1 mile 41 chains of tramway, for which a capital of 25,000*l.* is required, or at the rate of about 16,000*l.* per mile, with no land to purchase, cuttings, embankments, or other works, beyond laying a light permanent way, that costs for heavy railways less than half the amount.

The Metropolitan Railway District group embraces nine Bills, for the construction of 10¼ miles of new lines, that are all suburban, the most extensive being the Metropolitan and St. John's Wood new lines, of 5 miles and 10 chains, for an extension at Finchley-road, a line to the Hampstead Junction Railway, at the Edgware-road, a second to the Midland Railway, and a third by Willesden to Kingsbury. The additional capital to be raised is 400,000*l.*

HOW FAR IS AN ARCHITECT LIABLE?

"H." in your last number (p. 152) wishes to know what is the use of an architect's certificate. I am sure he will pardon me if, in the desire to be explicit, I happen to state anything with which he feels himself already acquainted. The certificate for final payment is, as I take it, immediately in question. The certificate for works in progress does not, however, materially differ in purpose. Both are, I contend, given simply to guide the payments, and are in the nature of somewhat confidential communications between the architect and the client. A certificate for final payment is always indubitable evidence that the works are substantially complete,—that every important matter *is done* that the letter and spirit of the contract stipulated for. If in any instance this was not the case, the architect would be legally liable for neglect. [Of course, as a matter of fact, architects, if at all judiciously-selected practitioners, take pains to make their certificates as final as they can in every way,—withhold them if not satisfied, &c.,—so that, where the surveys have been fairly frequent, and the scrutiny of the works keen, clients usually and justly regard final certificates as pretty good evidence also as to the character of the work and its correspondence throughout with contract drawings and specifications.] If anything further than the fact of completion was vouched for, the architect would cease to be the overlooker of the works, and become a guarantor of efficiency, a *rôle* that he is never, I think, employed or paid to take. In truth, as your correspondent, "Z.," hints, the scale of the architect's pay should be evidence enough as to this. He is (in the absence, be it always said, of special agreement which might provide for any amount of extra supervision) a designer and constructor, who also undertakes to see that his designs are carried out so as to realise his intentions. It is not by detecting and exposing, as he does at times, the misdeeds (the intentional scamping) of tradesmen that he justifies his existence. His employment would have a poor basis if this was the case, since one soberly believes that,—all due allowances being made,—a true tradesman wishes and aims at and takes a pride in doing fairly. No one provably doing otherwise wilfully should stand a chance of being employed by any one. No judicious person, one inclines to think, would, however, dispense with an architect's services in any building matter, even if he could secure right-doing on the part of tradesmen, carried to the length of neglected self-interest. But I must not be led away into general considerations, which would call for more space than you would afford me. It should be a support to what I have said, that contractors show no desire to consider themselves cleared of liability by the architect's final certificate. In the "conditions of Builders' Contract, prepared by the London Builders' Society," clause 11, runs thus:—

"Any defects, shrinkage, and other faults which may appear within months from the completion of the building, and arising out of defective or improper materials or workmanship, are, upon the direction of the architect, to be amended and made good by the contractors at their own cost, unless the architect shall decide that they ought to be paid for the same; and, in case of default, the employer may recover from the contractors the cost of making good the works."

And the last sentence of clause 17 makes it clear as to the continuing liability, notwithstanding the certificates:—

"Provided always that no final or other certificate is to cover or relieve the contractors from their liability under the provisions of Clause No. 11, whether or not the same be notified by the architect at the time or subsequently to granting any such certificate."

Clause 18 makes clear what the framers of this contract consider the certificate,—what it is to do and what it is not:—

"A certificate of the architect, or an award of the referee hereinafter referred to, as the case may be, showing the final balance due or payable to the contractors, is to be conclusive evidence of the works having been duly completed, and that the contractors are entitled to receive payment of the final balance, but without prejudice to the liability of the contractors under the provisions of Clause No. 11."

In discussing this question, time agone, with an intelligent and responsible builder, he justified some such arrangement as this:—"——months" (say six to twenty-four, according to the size and kind of work), not on the ground that he wished to avoid fair responsibilities, but on the principle of Statutes of Limitation,—the evidence being much affected by short lapse of time,—buildings are altered or neglected, architects die, foremen emigrate, &c. Therefore the shortest time, he argued, should be named that will give the building a fair and thorough trial, and after that time no inquiry should be possible. One is bound to confess that a fair-seeming argument can be made in this way,—but not a thoroughly convincing one. I subjoin a clause long in common use which is not unfair, and should not be objected to (in fact, is not objected to) by well-intentioned tradesmen:—

"Should any flaws, cracks, settlement, shrinkings, or defects of any kind whatsoever arise, occur, or become evident during the progress of the works, or within the above-mentioned .... weeks [before the final payment] from the completion and delivering up of the same, *or at any time thereafter*, which are fairly attributable to the use of bad materials, workmanship, or negligence, the contractor shall pull down and rebuild or rectify and make good the same at his own expense, to the satisfaction of the architect; and shall not be considered in any manner relived from liability as to the same by the fact of payments of moneys having been previously made on the certificates of the said architect. And in case of default, the said .... [proprietor] may recover from the said contractor for the damage sustained by him in consequence of such defects, or for the cost of pulling down and rebuilding, rectifying and making good, the works, and for damages sustained by the said .... [proprietor] in consequence of the same."

"Hard cases make bad law,"—and bad rule and custom also, one may add. While one must acknowledge that "A Sufferer's" architect was obviously very blind and negligent, and "A Sufferer" was very badly served, on looking at the whole question of supervision in building trades, one is not inclined to recommend a revolution by which the architect would become a capitalist underwriter, instead of (what he is now understood to be) a director of works.

X.

SIR,—In reply to this question, I will refer your correspondent "H." to the practice of the medical profession. If "H." should be so unfortunate as to require the services of a medical man, and calls in a physician, that gentleman prescribes, and on subsequent visits watches the progress of the disease; but if "H." sends his prescription to be made up by a vendor of adulterated drugs, instead of a properly-qualified dispenser, and fails to recover, or gets poisoned by the negligence of a shopman, it will scarcely be expected that the physician be liable to blame. The same with an architect: if he furnishes a proper plan and specification, and such general supervision as would be required where a respectable and able tradesman is employed, that is all that should be expected from him; and when the work is finished, the architect certifies that the contractor is entitled to the amount of his contract, and that the work is completed according to specification, so far as can be seen; but this does not screen the dishonest builder, for it is always to be implied that it means "fraud excepted."

Unless the tradesman be well known as a reliable and experienced man, it is absolutely necessary to have a clerk of works to see every portion of material before it is placed in the work; and, even with an honest man, in large works, owing to the ignorance and incapacity of workmen generally, this is desirable and more satisfactory to the contractor. I have frequently protested against the employment of incompetent and fraudulent men, and, in reply, have

been answered somewhat to this effect,—"We consider it necessary to accept the cheapest man, and must look to you to take care that we get our pound of flesh." In the early days of my practice I was, to some extent, compelled to fall in with this; but the result was frequently bankruptcy of contractor, who was insolvent to commence with, and I became branded as a tyrant, whose delight was to ruin every tradesman he had to deal with. I do not wish to appear one-sided in my remarks, but am willing to admit that there are many young architects who would be better fitted for their duties if they followed the good old practice of working at the several branches of the building trade for a few years, either before or just after their pupilage, and there are sometimes instances where failures could be attributed to want of care or experience on their part, and for which a degree of liability would attach; therefore it would be just as unfair to endeavour to make the contractor responsible for this as it would be to expect the architect to make good defects arising from the rascality of the contractor, and put out of sight during his absence. Z.

WAREHOUSE IN VICTORIA-STREET, BRISTOL.

A NEW warehouse has been built in Victoria-street, Bristol, for Mr. Joseph Birtwell, iron-founder. Mr. H. Masters was the architect, and Messrs. Ford & Summers were the contractors. It was designed specially to admit of a good amount of the class of manufactures which Mr. Birtwell produces. Ornamental rain-water pipes border the frontage on each side, and the low parapet forming the gutter is fringed, in the French manner, with high cresting. The windows, which have stone arches carried on ornamental iron columns, pyramidise, so to speak, there being three openings on the ground floor, two on the next, and one at top, producing a somewhat odd effect. The ironwork is from original designs. The iron panels on the door represent the various stages in the process of iron-working, and some small carvings in the stone work show the three degrees of progress of the trade—the top, "mining," and the two lower, "smelting" and "forging" respectively.

CHESTER WORKHOUSE COMPETITION.

THE building committee considered the plans, and selected for the consideration of the Board numbers 1 (Experior), 3 (Fidelis), 4 (Deva), 6 (Ventilation), 8 (We fight to win), 9 (Cestria), 10 (a wheat-sheaf), 13 (Castrium), 16 (Rusticus), 19 (Palmam qui meruit ferat), 25 (Dee Side), 26 (Alpha), 30 (Idoneum).

After a long discussion, it was resolved, on the motion of Mr. Salisbury, that the thirteen plans be referred back to the committee, and that they take steps to see some competent persons upon the matter, and satisfy themselves that the work can be carried out for the money stipulated.

WHOLESALE FISH-MARKET FOR LIVERPOOL.

DURING the past week there has been commenced in Liverpool a new fish-market, somewhat similar in its design to that of Manchester, described in last week's *Builder*, except that the Liverpool structure will be exclusively devoted to the wholesale trade. Hitherto there has been no acommodation for the wholesale fish trade; the dealers have had to be content with two comparatively narrow avenues near the retail market in Great Charlotte-street, which, besides being totally unfit for the purposes of the trade, were not even spacious enough. The consequence has been that for many years, the London and Manchester markets have been better supplied than the Liverpool market, and various inland towns have been in the same position. At the last meeting of the Liverpool town council, a tender of Messrs. R. Wells & Sons, contractors, Commercial-road, Liverpool, for alterations intended to accommodate the wholesale trade, was accepted by the council; so that the complaints that for years have been made by the dealers, will be productive of a substantial local improvement. The cost of the alterations will amount to 1,541*l.*, and the enlarged space will be made by extending the retail market on the west side, across the present open passage near the Amphitheatre. By taking in a portion of the retail market, a wholesale market of 600 square yards will be provided; the retail market possessing under the new arrangement, 1,000 square yards. The present retail market will be entirely re-arranged, but there will be no diminution of counter space, although the area of the market itself will be reduced. At the north end of the market, in Rose-street, space will be provided for the accommodation of the vehicles which will convey the fish from the wharfs and quays. The present frontage to Great Charlotte-street will remain, but it will be extended laterally, the style of the new additions being assimilated to that of the old. These alterations will, it is expected, be finished in about four months.

DWELLINGS OF THE POOR.

THE Special Dwellings Committee of the Charity Organisation Society held its second meeting last week, the Marquis of Westminster in the chair. A sub-committee was appointed, on the motion of Mr. V. J. Kay-Shuttleworth, M.P., to consider various suggestions and advise the committee as to the best mode of dealing with the various branches of the subject. The sub-committee met on the 26th ult., and made some progress in their work.

MEDALS AND PREMIUMS OF THE INSTITUTE OF ARCHITECTS.

A VERY fair assortment of drawings and essays have been submitted this year, including six designs for a public hall in competition for the Soane medallion and 50*l.* For this it is more than likely that the drawings distinguished by the device of a bell within a circle will be recommended, and that medals of merit will be awarded to the authors of the drawings bearing respectively the mottoes, "Frustra?" and "They say! What say they?" The Institute Silver Medal, with five guineas, will probably be awarded to the author of the drawings distinguished by the device of a circle. (Building illustrated—St. Mary's Abbey, Malton, Yorkshire); and a medal of merit to the author of the essay on "Modern Art-Architectural Criticism," bearing the motto of "Unde et Inde?"

We are sorry to learn that an excess of disbursements over receipts, to the amount of 300*l.*, will have to be met at the special meeting on Monday next.

THE "HAWK AND HANDSAW."

IF Mr. Gedge will look over the preceding correspondence, he will see that there is no dispute about the word "hernshaw;" it is *hanser* that we are in trouble about.

At present "hanser" requires authentication. If Mr. Gedge can throw any light upon its use, for the heron, in Norfolk, we shall all be much obliged to him.

As to Mr. Barry Sullivan's reading, it must be conceded that every individual has a right to his own opinion, and any actor may alter an author's words for the sake of stage effect. But I do not find that either of his proposed new words, viz., "hern or heron," and "pshaw," exists any where in Shakspeare's text. Mrs. Cowden Clark's invaluable Concordance has no reference to either.

So far as Shakspeare's text goes, he may never have *seen* a heron; for there is no mention of it save in this doubtful passage. The word "pshaw," I think, is more modern than his day; the word "pish," which might be deemed a synonym, does occur in some editions; but unfortunately it is glossed as equivalent to "push." See "Much Ado," act v., sc. 1.

In sending this "note," I ought to make a reservation as regards Shakspeare's poems, apart from his plays. A. H.

THE CASTLE OF PONTEFRACT

"Our histories," says Swift, "are full of Pomfret Castle;" and although this has long ceased to be the case, and Pomfret be now famous but for cakes and the cultivation of the root employed in the soothing of catarrh and the adulteration of railway coffee, it was once a very famous, and is still a very interesting, place.

Whence came the name of Pontefract, and when and where its bridge was broken down, are questions over which antiquaries have long stumbled, seeing that the Aire, the only stream of the district needing to be traversed by a bridge, is two miles from the town and quite out of its girth.

It appears from Norman charters that the name of the place was Kirkby, a name, no doubt, bestowed upon it when church and hamlet were founded as a Christian settlement, in the old days when King Oswald of Northumbria embraced the new faith, an event probably commemorated by the cross which gave name to the wapentake still known of Oswald's or Osgod's Cross. Kirkby, however, is not named in Domesday, though probably even then a burgh. It is evidently included in the manor of Tateshall, or Tanshelf, which belonged to the king, and appended to which was the soke of Manesthorp, Barnebi, and Silchestone. Tateshall formed, and still forms, a part of the town of Pontefract.

No doubt this is the "Taddenes Scylf," where, in 947, King Eadred received the fealty of Archbishop Wulfstan and the Northumbrian Witan, as recorded, with their speedy breach of it, in the Anglo-Saxon chronicle. The place must even then have been of importance, and there can be but little doubt that the Witan met on the site of the later castle. Also it continued to be an important place, for at the Conquest it was a demesne of the Crown, and is recorded in Domesday as rated at 20*l.*, having three mills, and containing a hospital for the poor. Domesday, no doubt, means Pontefract Castle, when it records that, "*Omnis tornour sedet infra metam castelli Ilberti secundum primam mensuram, et secundum novissimam mensuram sedet extra.*" *Meta* is here clearly the castle garth or boundary of its immediate lands, not the military *enceinte* or curtain about the position, with respect to which no measurement could be in error, nor is it the Castelry, which was a much larger area.

The parish of Pontefract, which is large, is composed of six townships, of which one is Pontefract proper. The parish is one of twenty composing the wapentake or hundred.

Leland, who calls the fortress "Snorre Castle," says that before the Conquest it belonged to Richard Aschenald, and then to Ailric, Sweine, and Adam, his son, grandson, and great-grandson. This last had two daughters, married to Alex. de Crevequer and Adam de Montbegon. Dodsworth calls Aschenald, Aske, still a great Yorkshire name, and points out, what indeed is still very evident, that the Norman works stood in part on an artificial hill, on which no doubt stood the house of the English lord, dispossessed by the Conqueror.

Ailric is a real person, and a Domesday landowner, and before the Conquest held many manors. Sweine was his son, and inherited, and gave a church and chapel to the monks of St. John's Church at Pontefract. Ailric held his lands, much reduced, under the Norman grantee, as did Sweine, and Adam Fitz Sweine, who founded Bretton Priory, and died about 1158, having been a very considerable person. Charters by both Sweine and Adam are found in the Pontefract cartulary.

William I. was at Castleford on the Aire in the winter of 1069, and as he stayed there three weeks he probably found the means of inspecting so strong a place as the English House at Kirkby, and when he granted the district to Ilbert de Lacy it may reasonably be supposed that he followed his usual practice of directing a castle to be built.

Mr. Freeman suggests that the name of Pontefract may have arisen from some incident connected with this passage of the Aire; others have thought that, like Richmond and Montgomery, it was an imported name. Ordericus, however, as Mr. Freeman remarks, refers to it as *Fractus-Pons*, not *Pons-Fractus*, "*Rex . . præpeditur ad fracti pontis vada*," as though the words were in a state of transition from a description to a proper name. The change of name certainly was adopted slowly, for while an early charter by Robert de Lacy, the second lord, has the passage, "de dominio suo de Kirkbi," a later one has "Deo et Sⁱᵉ Johanni et Monachis meis de Pontefract," while Hugh de Lanval, the intrusive lord, at least as late as 1120, employs the older name. Robert of Castleford, a good local authority, writing about a century after the event, says the name commemorates the escape of a multitude of people from drowning, when a bridge broke down beneath them. There is, however, no river within two miles of Pontefract capable of drowning a multitude.

Camden derives the name from the breaking down of a bridge or causeway that traversed the

marshy valley still called the Wash, the springs of which rise close N.W. of the castle and cross its approach from Knottingley, at Bubwith Houses, where, in the time of Edward II., John Bubwith held lands *juxta veterem pontem de Pontefract*, about a quarter of a mile from the castle, which, indeed, proves the existence of a bridge, though not of a broken one. How water came to be here collected will be explained when the defences of the castle are treated of. Perhaps the real truth of the matter may lie in the suggestion of Hopkinson, that the castle was called after a place of that name belonging to De Lacy in Normandy.

A few marks of Roman occupation have been discovered here, and but few. Legeolium, the station of the district, seems to have been at Castleford, three miles distant.

But whatever may have been the origin of the fortress, or of its evidently pre-Norman earthworks, its recorded history commences with Ilbert de Lacy, to whom William granted Knottingley, a large portion of the wapentake, and other lands, including about 150 manors, chiefly in the West Riding,—where they fill seven pages of Domesday-book,—Nottingham, and Lincoln, of which those in Yorkshire were erected into an Honour, of which Pontefract, the strongest and most important place, became naturally the chief seat. Ilbert, though no doubt of near kin to the Herefordshire Lord of Ewyas and Holm-Lacy, was a different person. He is thought to have built Pontefract Castle before 1080, commencing it probably in consequence of the visit of the Conqueror, in 1069. If Sir H. Ellis be right, and it be alluded to by the Domesday entry, "*Omnis tornour sedet infra metam castelli Ilberti*," it was speedily completed. Ilbert also endowed the chapel of St. Clement within the castle, which, in some form or other, long survived. He lived into the reign of Rufus, from whom he had a confirmation of his grants. By his wife, Hawise, he left Robert and Hugh.

Robert de Lacy, called, from his birthplace, "of Pontefract," claims to have built Clitheroe, which has, indeed, been attributed to his second son. He also had a confirmation from Rufus. By Maud, his wife, he had Ilbert, who, with his father, on the death of Rufus, joined Curthose against Henry I., and fought at Tenchbrai. Both were banished, and Robert was disseized of Pontefract in favour of William Transversus, and then of Hugh de la Val, or Lanval, who held it to the reign of Stephen. Robert finally regained the honour, but King Henry claimed 2,000 marcs, and De la Val had 150*l.* for the demesne lands, and 20 knights' fees, which are entered in the Liber Niger in 1165 as held "de veteri feodo Pontisfracti." Robert confirmed some of De la Val's grants to Nostel, and founded the Cluniac Priory of Pontefract.

Ilbert de Lacy, next Lord of the Honour, fought at Northallerton, and was a zealous supporter of Stephen, on whose death he adhered to Henry II. He married Alice, daughter of Gilbert de Gant, but died childless.

Henry de Lacy, next brother, succeeded. To him is attributed the later Norman work in the castle. He appears in the Liber Niger as holding 60 fees. Henry II. confirmed him in the Honour of Pontefract, and the other English and the Norman possessions of his family. 12 Hen. II. he was assessed upon 79¼ fees. He was a considerable church benefactor, and gave St. John's Church and St. Nicholas's Hospital, both in Pontefract, to the priory there. He founded Kirkstall.

Robert de Lacy, his son, and successor to the Honour, was present at the coronation of Richard I. He died childless in 1193.

The heir, according to Dugdale, and in violation of an accepted rule of inheritance, was Albreda de Lizures, Robert's uterine sister. Mr. Hunter, however, in his preface to the Pipe-roll of 31 Hen. I. has shown that in all probability Albreda was the daughter of Robert de Lizures by a sister of Ilbert de Lacy, second of this name, and therefore Robert's cousin, and heir of the full blood. This point is important as setting aside what has been regarded as a singular exception to an accepted law. Albreda married Richard FitzEustace, Constable of Chester.

John, their son, who died before his mother, Lord of Pontefract and Constable of Chester, abandoned his House of Halton, took the name and arms of De Lacy, and died 1179, having married Alice de Vere.

Roger de Lacy, son and heir. 5 Richard I. he received from his grandmother the Lacy lands. He visited the Holy Land with his father in King Richard's train. 7 Richard I. he paid 2,000 marcs to have livery of the Honour of Pontefract, excepting the castle, which the king retained in his own hands, and to which he paid at least ten visits between 1205 and 1216. 1 John, he reopened the question of the De la Val 20 fees, for livery of which he paid 500 marcs; and 4 John, 1203, the king addressed a letter to the tenants directing them to acknowledge Roger de Lacy as their lord. Though John continued to hold the Castle, he employed Roger in various important offices, and made him governor of the strong fortress of Château Gaillard, on the Seine, in which he stood a very famous siege, only giving way when short of food, and deserted by the king. 13 John he paid scutage upon 47¾ fees of his own land, besides others which he held in wardship. He seems to have been the baron who, in the absence of regular soldiers, led the Chester minstrels to the relief of Earl Ranulph, when surrounded by the Welsh. He was a great soldier, and an openhanded benefactor to the church, and deserved the line with which the monks of Hanlau began his epitaph:—

"Hic sepelitur Heros generosus in orbe Rogerus."

Earl Roger died a young man in 1211. In December, 14 John, 1212, the Honour was in the king's hands, and he seems to have made free with its revenues; for in 1213 he directed 300 marcs from its issues to be spent on the works at Corf Castle. He married Maud de Clare, and was succeeded by his son.

John de Lacy had seizin 20 September, 1213, and paid John 7,000 marcs for livery of the Honour, less the castles of Pontefract and Durrington, which the king kept, and for the expenses of keeping which Peter FitzHerbert had an order on the Exchequer. John, who is styled in the writ John de Chester, joined the Barons against King John, and was duly excommunicated by the Pope. The mother of his children was Margaret, co-heir of Saer de Quincy, Earl of Winchester, by Hawise, Countess of Lincoln and co-heir of Ranulph, Earl of Chester and Lincoln. Early in the reign of Henry III., 1232, on the death of Earl Ranulph, Hawise seems to have made over her earldom to her daughter's husband, who bore the title till his death, in 1240.

Edmund de Lacy, their son, was, by the contrivance of Henry III., married to one of his foreign kinsfolk, Alice, daughter of the Marquis de Saluces. He inherited Pontefract, but did not assume the title of Lincoln, as he did not outlive his mother. He died 42 Henry III., 1258, having built the House of the White Friars, near the Barbican, at Pontefract.

Henry de Lacy, Earl of Lincoln, his son, was the greatest of his race. He married the heiress of Longspee, and in her right became Earl of Salisbury. He was in ward to the king, and in 1272 was knighted and made Governor of Knaresborough Castle. He walled the town, and commenced the Castle of Denbigh, which he is said to have left unfinished because his only surviving son was drowned in a draw-well in the Red Tower there. His other son had been killed by a fall from a tower at Pontefract.

Having thus no son, Earl Henry surrendered his estates to the king, who regranted them, 28th December, 21 Edward I., to him for life, with remainder to Edmund, Earl of Lancaster, and the heirs of his body. 28 Edward I., Queen Margaret was a visitor at Pontefract Castle, and during a short hunting excursion to Brotherton, was there brought to bed suddenly of Thomas, called from his birth-place. It is said that the house in which she took refuge, with 20 acres of land, was enclosed in a wall and ditched, and granted by the tenure of keeping the wall in repair. Earl Henry died at Lincoln's Inn, 1310, leaving a daughter, Alice, who married Thomas, Earl of Leicester.

Thomas Plantagenet, Earl of Lancaster, and, by his wife, Alice, of Lincoln, and Lord of Pontefract, succeeded. He was much at the castle, and probably refaced the lower part of the keep, built Swillington Tower, and no doubt some of the structures the bases of which remain in the main ward. He also in 1315 built Dunstanborough, and added Lancaster's Buildings to Kenilworth. Earl Thomas's history is well known. From Boroughbridge Field he was taken to Pontefract Castle, then occupied by the weak and vindictive king. He was imprisoned in Swillington Tower, tried and condemned in the great hall, and, in 1322, executed on the hill which still bears his canonised name, a mile to the north-east. He was buried in the Priory. The patent creating Harcla, one of his captors, Earl of Carlisle, was dated from the castle, three days after the earl's execution.

Countess Alice, whose character was unhappily not so impregnable as her castle, married secondly Eubolo L'Estrange, who died 9 Edw. III. Her third husband was Hugh de Fresnes, called Earl of Lincoln. There was a fourth, earlier in the list, whose claims are doubtful. Alice died 1348, but Pontefract and the other possessions had already passed, under the re-grant, to her husband's brother.

Henry Plantagenet, Earl of Lancaster, succeeded to his brother's honour in 1324 and died 1345. Edward III. probably retained the castle. He was here in 1328. By Maud Chaworth Earl Henry had another Henry.

Henry Plantagenet (Tort-col, or of Grismond), Earl of Derby, &c., and, in 1351, Duke of Lancaster. He died 1361. Blanch, his second daughter by Isabel Beaumont, and co-heir, inherited Pontefract Castle and Honour.

John Plantagenet, of Gaunt, Duke of Lancaster, married the heiress and became Lord of Pontefract. He much resided at Pontefract, and restored the works. When threatened by Richard II. he victualled and put the castle into a state of defence. 12 Rich. II. he obtained by charter "jura regalia" within the honour. Parts of the half-covered basements in the main ward appear of his time. He died 1399.

Henry Plantagenet, of Bolinbroke, Duke of Hereford, afterwards Henry IV., son and heir, succeeded, being then in exile. Richard II., by confiscating the estates, provoked reprisals, which led to his own deposition. Pontefract Castle became his first prison, and the scene of his supposed murder. Since that event the castle has been vested in the Crown. Richard Scrope, Archbishop of York, was here condemned to death in 1405, and at that time Henry IV. was much here, putting down the Northern insurrections. Many of his instruments are hence dated between 1405 and 1408.

Henry V., much occupied with foreign wars, and having peace at home, had no occasion to make use of Pontefract, which seems to have been neglected in its military capacity; but here Charles, Duke of Orleans, taken at Agincourt, and James I. of Scotland, were long confined, both accomplished men and given to literature.

With the civil dissensions that came under Henry VI., the castle became again of importance. The Duke of Exeter, taken from sanctuary after St. Alban's, was here imprisoned: and in 1460, after the battle of Wakefield, Edward here took part, with his army encamped around. It was under the walls of the castle that Warwick killed his horse before the soldiers, saying, "Let him flee that flee will; I stay by him who stays by me." It was in accordance with this declaration that the king advanced from Pontefract next day, and defeated the Lancastrians at Towton. Edward's father, Richard, Duke of York, and his brother, the Earl of Rutland, slain at Wakefield, had been buried at Pontefract. He now added his father's head to his body, and removed the whole from St. John's Church to Fotheringay. During Edward's reverses and absence in Holland, the Lancastrians used Pontefract as a military prison.

In 1463, Edward was again at Pontefract, and in 1478, when he was escorted thither in great state, and remained a week.

The bloody celebrity of Pontefract was increased during the ascendancy of Richard, Duke of Gloucester, who sent hither Rivers, Grey, Vaughan, and Hawte to be executed without form of trial. Soon after his accession, he erected the town into a municipal borough.

The castle rose again briefly into notice in 1536, when Aske and the insurgents of the Pilgrimage of Grace appeared before it, and forced its surrender by Lord Darcy and the Archbishop of York, with more than a presumption of treachery. Henry VIII. was here in 1540. Two years later, Sir Henry Savile, as governor, had charge of several Scottish prisoners taken at Solway Moss.

Elizabeth, towards the close of her reign, repaired the castle, and rebuilt the chapel of St. Clement within it. King James was here in 1603, and made the castle and honour a part of the dower of his queen. He repeated his visit in 1616, and viewed the newly-established college of St. Clement, within the castle. King Charles was here in 1625, soon after his accession.

Pontefract was once more to become a place of military importance. Once the centre of the baronage of the north, it was now to appear as the rallying-place of the great aristocracy of Yorkshire, and of the Royal party. In 1642, when

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Charles lifted his standard at York, Pontefract Castle was garrisoned by a very strong force of local gentry and volunteers, with the gallant Sir William Lowther, of Swillington, as governor. Their courage was soon to be tried. After Marston Moor and the surrender of York, Sir T. Fairfax appeared before the castle, and in December, 1644, commenced its siege. The main attack seems to have been directed upon the north-west angle, where the Pix tower was battered, and fell, bringing down part of the adjacent curtain with it. The enemy, however, did not storm, and the breach was made good with earth. Mines were then tried, and one was sprung near the king's tower, at the south-east angle. These were met by counter mines, for which the ground, a soft rock, was very favourable. Very many shafts were sunk near the walls in the main ward, and no doubt are still in existence. Both attack and defence were carried on with great spirit, but at last stores began to fail, and matters looked ill for the garrison. They were reduced to extremity when, on the 1st of March, Sir M. Langdale arrived with 2,000 men from Oxford, and forced Lambert to raise the siege, while he victualled and reinforced the garrison.

The Parliament, however, was now in the ascendant, and in a few days their forces were recruited, and again appeared before the place.

This time regular trenches were opened, batteries thrown up, and a complete line of circumvallation laid out. This was of an oval figure, completely inclosing the castle and its outworks. The contained area, from the head of Micklegate by Knollys's Hospital on the west, to Monk-hill near New Hall on the east, was 900 yards; and from Baghill on the south, to the middle of the Abbot's Closes on the north, 700 yards, and about 3,000 yards in girth. Upon this line, which in parts commanded the castle, were thrown up twelve regular places of arms, redans, or batteries, besides flèches and lighter works on the intermediate curtains to beat off the frequent sallies of the garrison. General Sands commanded, and General Overton was governor of the town. New Hall, a large mansion of the Talbots, to the east of the castle and outside the lines, was entrenched, and occupied by Sir John Savile. The garrison held Swillington tower, the tower of the great church, and Neville's mount, a cavalier thrown up by them within the barbican, and carrying a large iron gun. These advanced works were of great service, as they both retarded the siege works and protected the repeated sallies from the garrison.

The trenches were opened in March, but it was the 24th of May before a battery was opened upon the keep. General Poyntz then took the command of the attack. It was, however, late in May before the church-tower was battered down, and the post therefore abandoned. Notwithstanding the disastrous news of Naseby, Lowther continued to hold out, and it was not until July 20th, after four months of siege, without further supply of stores or ammunition, and without a chance of relief, that he surrendered upon excellent terms. The fall of Pontefract was followed in three days by that of Sandal Castle, within signal of its towers.

The Parliament spared Pontefract on account of its strength, and put in General Cotterell, with a garrison. The Royalists, however, were still strong in the district, and June 6, 1648, it was recovered by the treason of Morrice, a renegade, but a man of courage. A garrison was quickly collected, and the castle became once more a Royalist centre.

A third siege thus became necessary, and such was the strength of the place that, discouraged as the Royalists were, it promised to be a troublesome one. General Rainsborough, who was appointed, met his death before taking the command, which fell at first to Sir H. Cholmley. Cromwell himself was present for a time, and a work on the north fort bore his name. He, however, left Lambert in command. Meantime, the King's death had broken up the party; and ultimate success being impossible, the governor, Morrice, listened to terms. He himself and some others were excepted by name. The difficulty thus created was ingeniously evaded. The excepted persons being reduced to three, they were walled up in one of the subterranean chambers, well provided with food and air, and Lambert was made to believe that they had escaped. The place was then surrendered, Lambert entered March 24, 1649, and as he did not retain the place, the three culprits got away safely. Parliament now ordered the castle to be demolished, and the only record of the details of its parts is that preserved in the schedule of its destruction. The materials—timber, lead, glass, and iron, sold for 1,779*l.* 17s. 4d., of which 777*l.* 4s. 6d. was the cost of demolition, 1,000*l.* was paid to the town, and the balance of 2*l.* 12s. 10d. went to the Commonwealth. This last creditor, however, received afterwards some arrears amounting to 145*l.* 11s. 7d., and so, in an account of profit and loss, was wound up the history of one of the strongest and greatest fortresses in the North. A description of it will follow. G. T. C.

SIR EDWARD LOVET PEARCE, ARCHITECT.

("EDWARD PEARCE.")

ON several occasions the query has been put, through the pages of the *Builder*, as to "who was Edward Pearce?" as all that has been known of him to our English architects was, that he was author of a work on Friezes, "Sould by John Overton, att ye White Horse, Without Newgate, neare the Fountaine Tavern." Now, if the present writer mistakes not, he has succeeded in identifying and "fixing" the entity of this Edward Pearce, who has been for a long time an *ignis fatuus*, whom, though seemingly within our reach, we have failed to secure. We have strong reasons for believing that Captain Edward Lovet Pearce, Surveyor-General of his Majesty's Works in Ireland, and the official acknowledged architect of the Irish Houses of Parliament, commenced in 1728-9, was no other than the missing "Edward Pearce." If we fail in the following particulars to prove that both are identical, we shall succeed at the same time in bringing into more prominent notice a second Edward Pearce, who by his work deserves a fitting niche in the "Dictionary of Architecture." Owing to the decay of Chichester House, where the Parliament in Dublin used to meet, a committee was appointed to report on the condition of the edifice, and to estimate for the construction of a new Parliament House. Matters hung on until 1727, when it was found impracticable to retain the old building. A report was then made, advising that a new building should be erected. In 1728, a sum of 6,000*l.* was voted towards the providing of the materials and construction, and Thomas Burgh,* the predecessor of Pearce as Surveyor-General, was ordered to prepare a plan of the building. On the 3rd of February, 1728–9, the first stone of the new building was laid, at which ceremony attended the Lords Justices, several peers, the King-at-Arms, and *Captain Edward Lovet Pearce*.

Passing over the particulars attending the foundation and ceremonial, we may note that Thomas Burgh, who was instructed by the House of Commons to prepare the plans, held the office of director-general and overseer of fortifications and buildings from the year 1700 to 1730. In all the official documents of the time, Mr. Gilbert says, in his "History of Dublin," Sir Edward Lovet Pearce appears as the designer and director of the new Houses of Parliament.

A committee was appointed in 1729 to report on the progress of the buildings, and reported most favourably of the works. They could not, they said, "help observing with the greatest pleasure an uncommon beauty, order, and contrivance in the building, and that the same had been carried on with unusual expedition and diligence; that the money expended thereupon had been laid out with the greatest frugality, and the accounts thereof kept in the most regular and orderly manner." It is further observed that "the director appointed by the Government had attended the said work from the beginning with the utmost application, and had thereby saved a large sum to the public, which in the course of such work by the ordinary method must necessarily have been expended, and at the same time had charged nothing for his own great expenses, skill, and pains." The same day that this report was brought before the Commons, the sum of 1,000*l.* was unanimously voted to the director (or architect) for his great success. The first session of Parliament in the new building was opened in October, 1731, by the Duke of Dorset, the then Lord Lieutenant of Ireland; and in the December of the same year the Commons agreed to a resolution, and an address was presented to the Viceroy, asking that an additional sum of 1,000*l.* might be voted to Edward Lovet Pearce, "in consideration of the care and pains he had taken in carrying on the building of the Parliament House, and shall take in finishing the same." The House of Lords also unanimously resolved that the director had shown ability, skill, and workmanship, in the erection of the new building. It would be wrong of us here at this stage of our account to suppress the statements made shortly afterwards in public to the injury of Pearce. It was pretty openly stated that Pearce had obtained the plans and other assistance from Richard Castle, otherwise Cassels, a noted architect at the same period in Dublin. Some account of Castle we have already given in a previous volume of the *Builder*.* It was even stated that Pearce cheated Castle in the transaction, by not paying the amounts agreed upon between both. These statements received first currency through the medium of an anonymous work printed for private circulation in 1736. The writer, however, admitted that Pearce opposed him in a family lawsuit, and hence his enmity. Previously to the publication of Mr. Gilbert's work, the name of Richard Castle appeared in all the publications we have met with as the architect of the Irish Houses of Parliament.

Pearce is described by our anonymous writer in 1736 in unenviable terms.

In contrast to the above we have some lines written by a Henry Nelson, entitled, "The Speech of the first Stone laid in the Parliament House to the Government. February 3rd, 1728-9."

> "Next let my gratitude and due respect
> Be humbly paid to the great architect,
> And as his merit, let his praises ring
> Who did me first to this great honour bring;
> Let ev'ry tongue in softest notes rehearse,
> Time after time, the worth of Captain Pearce.
> All hail to thee! who only is the man
> That by your art has form'd this noble plan;
> And as the structures on my shoulders rise
> So shall your praise, exalted to the skies,
> The pile majestic shall its beauty show,
> And all its beauty to your judgment owe.
> To future ages celebrate the name
> Of its projector, and record your fame."

One of the friends and companions of Dean Swift, Dr. Delaney, in his poem entitled "The Pheasant and the Lark," alludes in a complimentary way to the architectural abilities of Captain Pearce.

It further appears that this Edward Lovet Pearce was a captain in Nevill's regiment of dragoons, and sat for awhile in the Irish Parliament as a member for Ratoath. Sir Edward Pearce died at his country-house in Stillorgan, county Dublin, in the year 1733, and lies interred in the village church of Donnybrook. He had a brother, a Lieutenant-General Thomas Pearce, who is reported to have served with great courage in the campaigns of Spain and Portugal. He was elected a privy councillor, and served as a member of Parliament, and also as a governor of Limerick. The brother, Thomas, was buried subsequently in the same graveyard with his brother, Edward Pearce.

Arthur Dobbs succeeded Pearce as surveyor-general in Ireland in superintending the finishing of the works at the Parliament House in Dublin, and it was said also of him, as it was previously said of Pearce, that he was greatly assisted in the work by Richard Castle. The works were completed in 1739, and in 1741 the Commons voted Arthur Dobbs 250*l.*, "for his care and pains in finishing the Parliament House."

In Mr. Gilbert's work already quoted, and whose statements may be relied upon as he quotes official documents, we find the expenditure for the Parliament House in December, 1735, including 2,000*l.* to Pearce, and 490*l.* paid in pursuance of an Act of Parliament to the proprietors of the several buildings which had to be removed, amounted to 28,471*l.* 10s. 5½d.

A Parliamentary committee, appointed in the same year to inquire into the state and condition of the building, resolved,"'that Sir Edward Lovet Pearce, late engineer and surveyor-general, and his executrix, Anne, Lady Pearce, had faithfully and honestly accounted for the several sums by him received for building the Parliament House." Of the subsequent additions to the Irish Parliament House, it is unnecessary to write in detail. The names of Thomas Cooley and James Gandon, two English architects, are associated with other additions to the Irish Parliament House towards the close of the last century. Gandon, the greater architect of the two, designed the Corinthian portico which was added as an entrance to the House of Lords on the eastern side. Flaxman, the English sculptor, designed

* Thomas Burgh was author of a work entitled "A Method to Determine the Areas of Right-lined Figures Universally; very useful for ascertaining the Contents of any Survey." Published in 1724.

* Castle was the author of "An Essay toward Supplying the City of Dublin with Water." He was the architect of many important buildings in that city. He died in 1751.

the three figures on the southern front of the building; but Edward Smyth, a native sculptor, executed them. These figures were added after the Union of Great Britain with Ireland. When the Parliament House was purchased, and altered to suit the requirements of its new tenants, the directors of the Bank of Ireland, Francis Johnston, the Irish architect, designed the new alterations and works that were commenced in 1804. It will be seen from our sketch that several architects had a hand in the building, designing, and subsequent alterations of the Irish Senate from the days of Thomas Burgh and Edward Pearce. English, Irish, and German (Castle was a native of Germany), each has his name associated with the building. Each adopted Ireland as the scene of their practice, and each and all rose to distinction and left works behind them by which they will be remembered.

Little remains now to say except that if our Edward Lovet Pearce is not *the* Edward Pearce of the "Friezes," let somebody give us as much authenticated proof that he is not the man as we have produced in favour of his being the man, or the nearest resemblance to him. Whether Capt. Pearce came to Ireland with the Prince of Orange, or in the reign of Anne, or the first George, we have yet to learn. He was in Dublin, however, at the commencement of George II.'s reign. We know the date of his death, and if there exists a tombstone still about his grave, his age may possibly be found stated thereon; and if not there, in the church register.

The name as spelt is not an Irish, but an English one. In the absence of knowledge of Pearce's precise age at death,—if we suppose him to be thirty years of age in 1688, this would make him of the age of seventy-five in 1733 at his demise. This would afford us sufficient room to prove that the style and typography of the work on "Friezes" (which bears no date) was in consonance with the period through which he lived, still supposing our subject to be the long-sought Edward Pearce.

NEW POST-OFFICE, ST. MARTIN'S-LE-GRAND, LONDON.

WE add to the illustrations already given in our pages of the New Post-office,* now nearly completed, the plan of the one-pair floor. The building has been erected, as our readers will remember, from the designs of Mr. James Williams, Mr. William Brass being the contractor.

PROPOSED CATHEDRAL CHURCH OF ST. MARY, EDINBURGH.

THE accompanying view represents Sir Gilbert Scott's design for the interior of the proposed cathedral for Edinburgh, looking towards the north-east. We have already given a view of the exterior, and the architect's own description of the design,† and we now append the Referee's comments on the design when it was submitted under the motto,

"*Auld Lang Syne.*"

"The architect's report in this case refers to three designs; two carefully worked out, and one indicated only by a sketch plan in the body of the report.

The design B appears to have been withdrawn; the following observations will apply therefore only to that marked A, though a word or two may perhaps without impropriety be given to the third, or sketch plan, shown in the report.

As regards Agreement with Instructions:—1. The area provided is very ample, there being sufficient space for 1,500 persons westward of the preacher, and exclusive of the choir and its aisles; and although, from the description, either of the alternative designs would seem to have provided a better area for preaching purposes, yet, notwithstanding the block interposed by the north-west pier of the tower, the clear area capable of being commanded by a preacher is considerable. As regards the daily services, the author says,—'I have carefully considered, but do not see any necessity (but the contrary) for providing a distinct position. It would seem to me a great pity that the services on minor, though the most frequent, occasions should be in a less dignified place than at other times. It is an arrangement not known in this country, excepting for early services, nor do I think it desirable. The question, whether at ordinary week-day services any part of the congregation should be admitted within the choir, seems one which should be left to the decision of the bishop and clergy. It is not essential to the arrangement to decide it while planning the cathedral, as, if not so admitted, they would simply occupy the space in front of the choir-screen according to their numbers.'

2. As to the organ, he says,—'I have provided for the organ in this manner. The lighter parts, especially the choir organ, with the keys and the organist's seat, I have placed close to the first bay on the north of the choir; but the larger and more cumbrous parts I have placed in the eastern aisle of the north transept, immediately behind a place where the sound would spread itself freely through both choir, transepts, crossing, and nave.'

3. The central tower being closed in at the level of the vaulting of the choir, there is ample space within it above that level for both bells and clock.

4. The chapter-house is of sufficient area, but can only be approached from the interior of the cathedral, and through a vestry,—a seeming defect, which is, however, capable of easy remedy.

5. The central axis of the cathedral is proposed to coincide with that of Melville-street and Grosvenor-crescent respectively.

As regards 'Coates House,' the author says,—'He should unquestionably retain it'; and adds, 'In a part of Edinburgh so essentially new, it is a most happy circumstance to possess upon the cathedral site a veritable old Scottish building. It is very picturesque in design, and will become more so by careful restoration. The internal accommodation is open to improvement, and I have no doubt that by judicious treatment it may be made a comfortable residence, while its presence will add much to the picturesque grouping of the ecclesiastical buildings.'

9. As regards cost, the author says,—'I have made a calculation as to the cost, which gives a result as favourable as I could anticipate; but as such works as this are rarely erected in our day, I will not pledge myself to meet your views with minute accuracy, but content myself with carefully aiming at the prescribed sum; and I believe that with care and reasonable economy, and possibly with the aid of some safety-valves, it may be realised, though it would not be wise in a matter proverbially so much of a lottery as the cost of a large building, to pledge oneself too minutely. My object has been to give the best and noblest church which your conditions appear to admit. I have made this my anxious aim, but beyond this I will not bind myself further than to say that I believe I have realised my aim with very reasonable accuracy. Some of the more decorative fittings, such as the reredos, may be looked for as individual offerings, and the painted decorations would not be included.'

In respect of Arrangement.—The plan of the cathedral is a broad and simple one. The building consists of nave and north and south aisles, central tower, north and south transepts, each with east and west aisles, choir and aisles, and square chapter-house connected with the north aisle of choir by a cloistral passage. The vestries are provided for in bays of the choir and transept aisles, screened off from the general area. The entrances are from the west end in the centre of the nave, and from the south side through the transept, neither of them screened internally.

In respect of Construction.—All the provisions are amply sufficient. The nave is roofed in wood, and groined internally in the same material; but the remainder of the church is groined in stone.

As regards Architectural Character.—The author says,—'He has met with some difficulty in selecting the variety of architecture on which to found his design, but he desired that it should not at the least be discordant with the finest Scottish examples,' and that 'he has been most impressed with the earlier phase of the Early Pointed, which especially unites the architecture of Scotland with that of the North of England; and is capable of the greatest possible degree of dignity united with simplicity and beauty.'

The design is consequently, throughout, bold and simple in its character externally; but internally decoration is more freely introduced. The most striking feature is undoubtedly the central tower, the massiveness and noble proportions of which would be of the greatest possible value on a site like that on which it is proposed to build, in giving a general dignity of effect to the whole structure. The tower for this purpose is designed with very considerable power. Other portions of the exterior, and notably the western front, are much less happy and forcible; but the eastern end of the choir is a fine and dignified composition. As regards the interior, it would, I think, gain in dignity, as it certainly would in simplicity, by the omission of the surface ornament in the clearstory windows, which tends to give prettiness to what would otherwise be vigorous and strong; but in the main it must be said, that if it has not much originality, it has at least as a whole a thoroughly church-like and dignified character much in accordance with ancient examples.

As regards Cost.—The architect appears to be disinclined to give any positive opinion; but, excepting in the tower, which on account of its bulk must necessarily be costly, the general character of the building is not likely to be excessive on this point. The comparison with other designs will be seen on the table of cubical areas."

We print this table, together with one as to cost, based upon it, in conjunction with the superficial areas measured within the walls:—

"*Comparative approximate Table of Cubical Contents.*

Cubical Contents measured internally between Ceiling and Floor.

	Design marked	Church and Vestries.
A	Fidelitas	859,453
B	Essayez-moi	989,895
C	Auld Lang Syne	793,993
D	⊕	736,910
E	Non ignotæ civitatis Municeps	646,994
F	✠ In hoc Signo	620,860

Cubical Contents measured externally from Floor upwards.

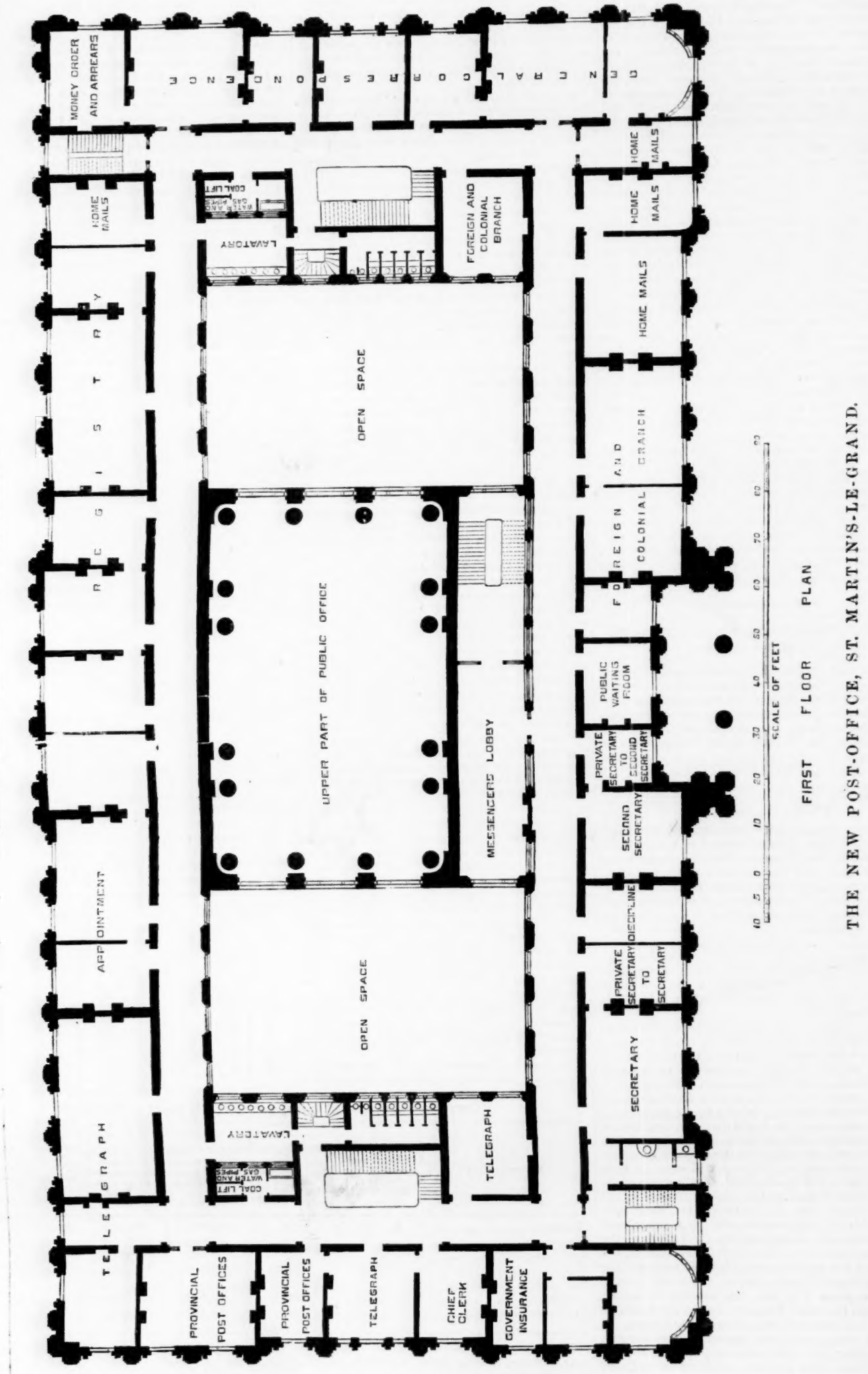
	Church and Vestries.	Chapter-House.	Total.
A	1,445,513	96,624	1,542,137
B	1,329,913	43,860	1,373,773
C	1,034,088	94,124	1,128,212
D	1,225,113	80,541	1,305,654
E	1,081,875	24,640	1,106,515
F	1,062,507	39,104	1,101,611

"*Comparison of Cost based as to Quantities on the preceding Tables.*

Design marked	Cost at 1d. per foot cube of Church and Accessories exclusive of Towers and Spires.	Comparative Cost per foot cube founded on detailed valuation.	Cost of Church and Accessories at rate given in preceding column.	Add on account of Towers and Spires and other extra features.	Approximate comparative Cost exclusive of foundations, internal fittings, &c.
Fidelitas	£6,426	12·9	£82,895	£20,500	£103,395
Essayez-moi	5,724	8·1	46,364	21,900	68,264
Auld Lang Syne	4,701	8·7	40,898	23,800	64,698
⊕	5,440	7·3	39,712	19,400	59,112
Non ignotæ civitatis Municeps	4,610	8·6	39,646	13,900	53,546
✠ In hoc Signo	4,590	7·5	34,425	16,000	50,425

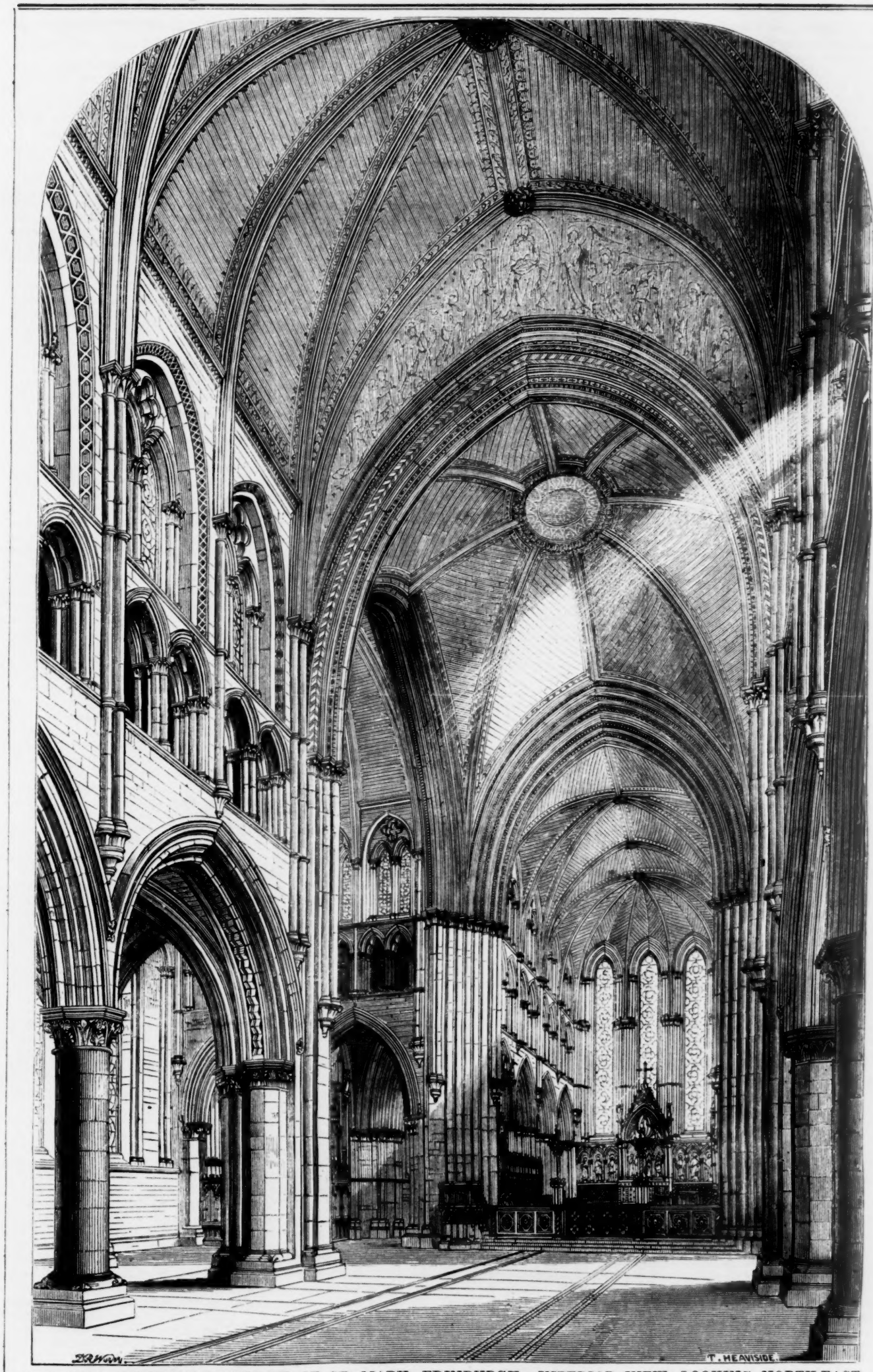
The comparative cost of *ordinary* foundations may be taken as from 4,000*l.* to 7,000*l.*, varying according to superficial areas and thicknesses of walls, &c. The cost of fittings, heating, and lighting would probably in each case be more nearly equal, but would vary according to material and design; probably 4,600*l.* would fairly represent an average estimate."

* See pp. 84, 86, 87, *ante*.
† See pp. 97, 106.



FIRST FLOOR PLAN

THE NEW POST-OFFICE, ST. MARTIN'S-LE-GRAND.



PROPOSED CATHEDRAL CHURCH OF ST. MARY, EDINBURGH: INTERIOR VIEW, LOOKING NORTH-EAST.
SIR G. GILBERT SCOTT, R.A., ARCHITECT.

IMPEDIMENTS TO THE CIRCULATION OF LABOUR, AND THEIR REMOVAL.

AT a recent meeting of the Social Science Association, Mr. Alsager H. Hill read a paper on this subject, containing matters of interest to many of our readers. We have condensed the pith of it:—

I shall submit, on the threshold, that the present circulation of labour in this country, as exhibited by the industrial and social condition of large masses of the people, is far from satisfactory. It may be observed that, notwithstanding the acknowledged prosperity and commercial progress of the country, there is still an immense mass of registered pauperism in our midst, which is certainly strangely inconsistent with the idea of our rapidly advancing civilisation; and it is further a remarkable fact that this pauperism is in many instances more than proportioned to the industrial activity of the district in which it is so registered. I find, for instance, that at the end of November, 1872, the number of persons in receipt of relief was returned as 820,919, and that out of that aggregate a very large proportion, amounting to more than 100,000, belonged to the metropolitan parishes and unions. I shall have occasion later on in this paper to call attention to the more special phenomena of industrial life, or rather stagnation, exhibited by the metropolis. For the moment, therefore, I simply point to the significant pauper-roll of the London district. It may, however, be still more instructive to look at the condition of things in South Wales, as illustrated by a recent circular letter, addressed by Mr. Andrew Doyle, one of the Poor-law inspectors, to the clerks of guardians, and in this letter, speaking of four Breconshire unions, Mr. Doyle says,—"Of superfluous labour it is needless to say that during the last year at least no such thing existed. The difficulty experienced by employers of every description of labour was to find hands to do the indispensable work of the district"; and yet, side by side with this statement, we find Mr. Doyle very properly remarking that "it appears to be most unreasonable that employers who are compelled to pay very high, if not exorbitant, wages, should at the same time be compelled to pay exorbitant poor-rates." And yet such is undoubtedly the case, be it reasonable or not. If, again, we turn to the Midlands, we shall find a heavy poor-rate, co-existent with an abundance of employment in almost every branch of our great industries. Looking to the Western counties, more especially Somersetshire and Devonshire, we still find a large registered pauperism; but a standard of wages, chiefly for agricultural services, infinitely below that of either the metropolis or the Midlands. It is, however, highly instructive to learn, from a recent Parliamentary paper, that, as far as official returns can be relied upon, a very small number of persons only in proportion to the aggregate number of registered paupers, are relieved on the ground of being out of employment and unable to obtain work; and, what is more significant still, of that small number, showing a total, if I remember rightly, of about 2,100, a very large proportion is returned from the metropolitan district, whilst from more than five counties, no cases of able-bodied persons relieved on the ground of being out of work, as shown in the books.

With these facts before us, it is therefore reasonable to suppose that no very large number of persons are, as some are apt to assume, continuously, and for long periods of time, out of employment; and yet, admitting this to be the case, there is still calling for explanation the important fact alluded to at the commencement of this paper, of an immense population dependent almost entirely on the better fortune or benevolence of their neighbours, conveyed to them either through the rates or private charity. This pauper population must clearly be the result of some imperfect organisation in our social system; and as labour constitutes the industrial life of the body politic, so this stagnation, taking the shape of direct or indirect dependence on others, must represent some congestion or other imperfection in the elements that go to the making of the true life.

From Phillips's "Million of Facts," I learn that the population of London, in 1836, was returned at 1,400,000; in the present year it stands at a figure rapidly approaching 4 millions. As the metropolis, and apart from its industrial capacities, it has for centuries past been gathering into its capacious maw all the ambitious and enterprising elements of the country population, and for almost as long a period other influences than those of ambition or of enterprise, of which I shall speak further hereafter, have tended to convert London into such a *colluvies gentium* as no writer, ancient or modern, could ever have contemplated in his most opprobrious mood. Assuming the industries of the metropolis to have kept pace with the influx of its rapidly-increasing population, a time must have come, when from its very physical and geological position, it must have given place to some of its more northernly sisters in the race for supremacy, and as it now is, with its multiplicity of industries, London must be considered rather as a commercial than an industrial centre.

In London, in consequence of the congestion to which I have just directed attention, labour of a certain sort, under the pressure of either hunger or tyranny, may be secured at almost any price that a master chooses to name. This fact, as I before remarked, is too often overlooked. It is, however, perhaps the best starting-point that I can take for my more practical observations on the impediments to circulation of labour and the best means for their removal. I may, I think, assume that London, if no other part of England, is over-stocked at the present time; and if corporeal illustration of this statement be required, I would ask some of those who hear me to pay an early visit to our dock sides and builders' yards at taking-on time, and judge for themselves.

How far some of the deteriorated labour which forms a peculiar feature in the London market may be found on close analysis to be the natural *detritus* of great industrial activities, it may be difficult, if not, indeed, impossible, to determine. But it is surely more consistent with the higher teachings of social science to believe that much which is waste now might, if more equably distributed, become the marrow and muscle of our national life. Inactivity and stagnation, in the present condition of things, must surely, to parody Lord Palmerston's celebrated aphorism on dirt, simply denote labour "in the wrong place." Assuming, therefore, much of this congested metropolitan labour to be in the wrong place, let us consider the causes which have mainly brought it here. It is almost unnecessary to point out that the first and most general cause of this, as of most other social diseases, is ignorance, and in this case, probably ignorance of many kinds. Ignorance of physical geography and the lessons which it carries with it can be made to account for the blind and infatuated impulse which leads generation after generation of the dwellers in the country to seek their fortune in our cities and great towns, rather than in other districts where their native energies might soon be adapted to the work which lies ready to their hands. I need hardly detail the condition in which most of our rustic population are left with respect to the resources of their own country on leaving the village schools; and I am not going far wrong when I say that in nine children out of ten the mountains of Palestine are better known than the hills of Cleveland or the busy valleys of South Wales. On technical and industrial matters their minds are generally a still denser blank; and when the young man sets forth from home in search of work, in all probability his face is turned north or south, according to the last intelligence of his village inn, or in pursuance of some capricious fancy, such as a desire to see London, or find out a cousin in some distant town, rather than in obedience to any ascertained necessity for the man's services outside the limits of his own hamlet or county.

Passing from ignorance as a primary cause of imperfect circulation of labour, I would touch in a few sentences on the resultant want of organisation for facilitating the processes of supply and demand in the adjustment of the labour market; for it is not necessary for me to point out that the mere economic law of supply and demand, without a well-regulated social system, can no more insure the industrial life of a country, than can the elements which make up the blood insure a healthy circulation without proper exercise and temperance in the organism it pervades. With respect to organisation I shall probably be told that this has in a great measure been met by the institution of trade-unions; but even at its highest reckoning the nominally organised labour of the United Kingdom cannot be set at much above 800,000 persons, whilst the available working population may be set down at an aggregate of at least 6,000,000 of persons. Moreover, as I know from careful examination, much of this organisation, apart from that provided in such bodies as the Amalgamated Engineers, carpenters and joiners, stonemasons, and a few others, is of the most imperfect kind, and utterly unable to grapple with the complex difficulties of a constantly changing labour market. Hitherto the best of these organisations have been elaborated, as might have been expected from the superior intelligence of their members, by the higher skilled trades; but within the last year the elements of organisation have made themselves apparent, and in a very active form, amongst the most numerous and ignorant classes of our labourers, namely, the agricultural. And according to some reports, the number of actually enrolled members in these latter organisations is now over 300,000, being more than a third of the aggregate estimated by Mr. Lloyd Jones a few years since, as included in the ranks of English trade-unionists.

In one or two cases, whilst factories are languishing for hands, new homes for orphan girls are being built, and columns of the newspaper filled with sensational appeals and repeated lists of ignorant subscribers, when a few pounds expended in adjusting the laws of supply and demand in certain branches of the national labour-market, by bringing employers and employed together, would have removed the necessity of the huge homes and subscriptions altogether. With respect to certain emigration charities, I can speak in even stronger terms, as these have to do with adult workers, whilst the other class is chiefly concerned with children; and one of the most common and natural consequences of these emigration charities is to send adrift a large number of men, either already earning or able to earn reasonable wages in their own country, to beg from door to door, or according to the more approved fashion, from selected benevolent persons, to enable them to leave the country at a time when coal is rising daily from the scarcity of the getters, and miles of railway are waiting for completion, because the labourers are not to be had. Much more might be said on the influence of charity in its bearing upon my subject this evening, but I pass on to notice another existing impediment to the circulation of labour, namely, *the influence of misdirected trade-unionism*. I say purposely misdirected trade-unionism, as I have before expressed my general belief in the advantages of the best managed societies in the direction of organisation, and it may perhaps seem strange that trade-unionism, the very basis of which is assumed to be a healthy distribution of labour, should in any way interfere with the currents of circulation. What, however, I conceive to be a mistaken policy with respect to the standard of wages sought to be regulated by the action of trade societies, not unfrequently results in large numbers of men, and as frequently non-union as union men, declining to quit crowded centres in which work is slack, though work may be indicated to them elsewhere at wages which they are not willing to accept. The natural consequence is that large numbers of men beginning with an assertion of dignity in not accepting anything under their own estimate of their value, end by joining that great army of the partially unemployed, who lower London wages and increase our poor-rates.

Under existing circumstances a personal search for work is in many cases almost essential; and, except where the railway system is very complete, travelling by train would be almost impossible. Nevertheless, with better information at starting, an immense amount of unnecessary travel and toil might even now be saved. When, however, the workman is obliged to take the train, even a Parliamentary fare is a very heavy tax, except upon high prospective wages; and when the family accompanies the workman, the burden becomes one which only a very long job seems to justify.

Following on the want of cheap and effective locomotion, may be mentioned the want of cheap and suitable accommodation for workmen at many of our industrial centres, and the providing of cheap and good animal food. To any one who carefully studies this question, it will soon be apparent that the adaptability of labour to different conditions of life from that to which it is accustomed, is largely a question of food; and the experience of the late Mr. Brassey, as recorded in the very interesting memoir by his son, goes to show that with care even raw agricultural labour may soon, under good conditions of diet, be converted into a quality vailable for the heaviest railway or dock work.

The only other impediment to the circulation

of labour which I can now touch upon is the pernicious and wide-spread system of dealing on credit which prevails among our working population. In the recent extensive migrations of labour which have taken place since the formation of the various agricultural labourers' unions, it has been a constant complaint with the local secretaries that the debts at the village shops have prevented the men getting away; and the same difficulty, though perhaps in a minor degree, will be found to arise amongst our town population. The remedy for this state of things is obviously a system of ready-money payments; or, better still, in my opinion, in the spread of true co-operation, as understood in the North, under which, in addition to the avoidance of debt, a small, and in many cases a considerable, sum accumulates to the credit of the customer, which can, of course, be rendered available for migration or any other purpose.

METROPOLITAN FREE BRIDGES.

THE opening of Kew Bridge, free from toll, was an event sufficiently important to be well worth the ceremonial bestowed upon it. The Joint Bridges Committee are hastening, although their motto might seem to be *Festina lente*, still they *are* hastening, or at least, prosecuting steadily and perseveringly the great object they have set before them, by sweeping away the obstructions by tolls to the free passage across the river between the north and south banks of the Thames. Considering the opposition the committee has had to encounter, and the magnitude of the interests that have to be conciliated and satisfied, it is not wonderful that the committee have not done more, but that they have done so much. Already, within the last five years, the bridges at Walton, Staines, Kingston, and now at Kew, have been opened to the public free from toll, the last at a cost of 57,300*l.*, in payment of all claims for proprietary rights.

The opening of the bridges named are, however, only a good beginning with a good work, and it is much to be desired that the "Metropolitan Bridges Bill," now before Parliament, may have an unopposed and rapid course. It is promoted by the Metropolitan Board of Works, and is a Bill to facilitate the traffic of the metropolis, and to improve the communications across the river Thames, by providing for the opening of the present toll bridges for the free use of the public. The means by which the bridges are to be freed from toll is, the application to that object of the London coal and wine duties, which are continued by the Act of 1868 to the 5th of July, 1889. The bridges that it is proposed by the Bill to free from toll embrace the following goodly list:—Hammersmith Suspension, Fulham, Wandsworth, Battersea, Albert, Chelsea Suspension, Vauxhall, Lambeth, Waterloo, and Deptford Creek Bridges. The Board also takes power by the Bill for the extinction of toll upon the respective foot-bridges over the Charing-cross and Cannon-street railways. The Board will do well if they are able to carry out even half of their large-minded programme.

That most important public advantages would result from the adoption of this Bill, must be readily apparent. One of these advantages would be the better distribution of street traffic, and the relief of congested thoroughfares. This is evident in the contrast that the traffic by Southwark Bridge, as a free bridge, presents with what it was before the tolls were abolished, and by the contrast it now presents with the dreary quietude of Waterloo Bridge, which from the heart of Southwark debouches upon the middle of the Strand, but that, notwithstanding, may occasionally be seen at the busiest hours of the day, clear of vehicles between one tollgate and another, and the whole of the splendid structure in the occupation of the toll-takers at each end, and of a few straggling foot passengers between them. The effect that the freeing of the bridges from toll would have upon the value of house property and building land in many localities, would be immediate and important, but that is an element that concerns owners and occupiers more than the general public.

Another important benefit that would be conferred upon large masses of population in various localities, would be by extinguishing the tolls, to deliver them from a really grievous and oppressive impost. The Deptford Creek Bridge is a notable illustration of this fact. Between the most populous parts of Deptford, the Royal Victualling-yard, the Foreign Cattle Market, and Greenwich, the direct route is by the Creek Bridge, at which heavy tolls are charged for vehicles, and as much as one penny per head for men, women, and children, on foot. There is another, the Railway Bridge, available for foot passengers higher up the Ravensbourne, at which the same toll is charged, the distance by the Railway Bridge, about half a mile, being about half the distance that it is by the public streets and roads. The inhabitants of Deptford have long persistently pressed their toll-bridge grievance upon the attention of the authorities, and are naturally elated, as the inhabitants of other districts similarly situated may be, by the hope of early deliverance.

FROM SCOTLAND.

Edinburgh.—A new iron lattice girder bridge, erected by the North British Railway Company, at a cost of over 20,000*l.* has been formally opened by the Lord Provost. This bridge crosses the valley which separates the old and new towns, and connects Cockburn-street with Princes-street, besides affording access to the new passenger station of the North British Railway.

Paisley.—A public meeting of the ratepayers of the burgh parishes of Paisley has been held to consider a resolution of the Burgh Parochial Board to erect a new parochial asylum. There was a large attendance. The meeting disapproved of the resolution come to by the Burgh Parochial Board, because Mr. Craufurd, M.P., has again brought before Parliament a Bill to amend the present Poor-law Act which, if carried, would combine the burgh and abbey parishes, and thus have one establishment for the management of the poor, and also disapprove of the procedure of the majority at that Board in making contracts for the erection of this expensive asylum with such precipitate haste.

Fauldhouse.—A new Roman Catholic church is now rapidly approaching completion, and, when finished, it will afford accommodation for 500 sitters. The building is in the Early English Gothic style, and consists of nave and sanctuary, with vestry and choir gallery. The main entrance is in an end gable, and looks towards the public road. Over the doorway is a traceried circular window, and on each side of the door there is a double lancet window. It is proposed to erect a belfry and spirelet over the apex of this gable, but this part of the work will be a question of time and funds. The side elevations have buttresses and lancet windows, and the roof is open to the ridge. A chapel-house adjoining the church is in contemplation. The plans are by Messrs. W. & R. Ingram, Glasgow.

BELLS AND BELL-CAGES.

IN your recent article on "Belfries and Bells," you deplore the fact "that in the art of hanging and ringing bells we have hitherto gained but little from the advance of mechanical knowledge." Now as regards the hanging, the manner in which that should be done of course depends chiefly upon whether the bells are to be raised and rung or merely chimed. In the latter case, the hanging is a simple affair; but in the former, great care should be exercised in the design and construction of the bell-cage, so that it may be able to bear with safety the variety of strains and shocks to which it must be subjected by the reciprocating motion of the bells in ever-varying order, and to convey the resultant force of those strains downwards, and not laterally against the walls of the tower.

Eminent authorities tell us that it is of the greatest consequence that the timbers should take their bearing independent of the masonry; they should be laid on wooden plates, the whole resting either on stone corbels or on a set-off formed in the wall. The sides of the cage should not touch the wall at any point, but a clear space should be left the whole way round between the timbers and the stonework.

Many of our most celebrated church towers were built long before the present mode of ringing bells came into practice, and in some towers the bell-cage has been either built directly into the walls or wedged against them to steady it. I do not think, therefore, that it is fair to lay the blame of the mischief which has been done on the mode of ringing, but rather on the ignorance of bellhangers and those who have put heavy peals into towers which were never intended to bear the strains resulting from the present mode of ringing. It is well known that in many towers where the bells are properly hung heavy peals have been rung for a great number of years, and still continue to be rung, without doing the slightest injury to the structure. The tower of the cathedral of my own diocese, which was mostly rebuilt in the fourteenth century, is perfectly free from any vibration, the bells being hung as described above, all of it being absorbed by the loft on which the cage rests.

It is generally admitted that bell-ringing is an art, and, like many others, has been carried to a high degree of perfection. If in painting and other arts we cannot excel, or even come up to, the old masters, why should we be dissatisfied because the same effect which is produced by the bell-ringer's art cannot be produced by mechanical means? Is a barrel-organ, no matter how well constructed, to be considered an improvement on the manual organ, because the latter can only be played by learning the art, and not merely by turning a handle? And what is a carillon-machine but a gigantic barrel-organ, with only one stop, so placed that everybody in the neighbourhood must hear it and endure it, without being able to get the policeman on duty to make it "move on"? How inexpressibly wearying to delicate and sensitive ears will the same tune, repeated many times in the day, become, and that, in most cases, only the bare subject of a tune, without any of its mellowing harmonies. A bell, no doubt, produces some of the harmonies to its consonant, when struck, though in a subdued manner, and rather after than along with it, but not in a way that makes up for the absence of the full chord struck simultaneously. There is, no doubt, also, as you have remarked, that "a bell struck when at rest by a hammer produces, a dull, heavy, odious sound, as compared with the tone of the same bell when struck by its clapper as it swings round." The motion of the bell itself must therefore, I think, have a good deal to do with the quality and penetrating power of the sound produced, and that is also the opinion of the Rev. H. T. Ellacombe, than whom, I believe, there is no greater authority on the subject. As to the production of the other notes of the chord by striking the bell in different places, there is this one great difficulty to be got over, that if you strike the bell sufficiently hard to bring out its tone anywhere but on the sound-bow, it will most assuredly crack, sooner or later.

As a practical bell-ringer, I hope that it will be a long time before the present reviving interest in bell-ringing, as an art, and as a means of producing a most delightful species of music, which all may enjoy, is superseded by a desire to erect carillon-machines, however clever they may be as pieces of mechanism.

To defend their art from the charge of being barbarous I leave in the able hands of the Ancient Society of College Youths.

AN IRISH DIOCESAN ARCHITECT.

SCHOOL BOARDS.

High Wycombe.—The School Board for this borough are about to erect new buildings, to accommodate in all 600 children. The site is three roods in extent, on a commanding position. Public tenders will, it is believed, be solicited. The architect appointed is Mr. Arthur Vernon.

Kingston-upon-Hull.—The foundation stone of the first new Board School was laid here by Sir Henry Cooper, Knt., M.D., chairman of the Board, with appropriate ceremonies, on Monday last, the 24th of February. This school, situate in Daltry-street, is designed to accommodate 250 boys, 250 girls, and 260 infants, all on the ground floor. The boys' school-room is to be 75 ft. long and 20 ft. wide, having three class-rooms adjoining. The girls' department will be similar in size. The Infants' School will be 54 ft. long by 27 ft. 8 in. wide, with two class-rooms contiguous. There are three private rooms for the principal teachers, and all necessary offices. The cubical contents of the whole building, exclusive of earth-closets and boundary walls, are 250,510 ft. Mr. W. Barritt, of Hull, has contracted to execute the whole of the works for 4,407*l.* 18*s.* Messrs. Rundle & Parker, of Leeds, will supply the hot-water heating apparatus. The works are under the superintendence of Mr. Augustus W. Tanner, architect to the Board.

Derby.—A letter was read from Mr. Coulthurst, thanking the Board for appointing him architect to the new schools; and the Clerk said

that he had not received any reply to his letter to the Educational Department in reference to the extension of the Nun-street site. He had received a letter from Mr. Coulthurst in reference to the plans for the new schools.

Leicester.—The architects' committee reported that they had received tenders for the erection of the school in Oxford-street, a list whereof was presented with their report. The committee recommended that the tender of Mr. Sackree be accepted by the Board, subject to its receiving the sanction of the Education Department. The clerk then read the list of tenders:—

		Allowance on old material.	Tenders.
H. F. Allen	£6,465	£150	£6,315
F. Major	6,479	165	6,314
J. R. Ratcliffe	6,446	160	6,286
T. Bland	6,255	155	6,100
Osborne, Bros.	6,355	250	6,105
Neal & Sons	6,200	150	6,050
T. W. Herbert	6,190	170	6,020
T. Forster	5,720	150	5,570
J. Fern	5,640	110	5,530
J. J. Sackree	5,635	150	5,485
W. H. Kellett*	5,645	200	5,395*
Butler & Marshall	5,484	170	5,314

The Rev. Canon Fry moved that the report of the committee be adopted. Some discussion ensued, in the course of which Mr. Merrick moved as an amendment that the tender of Messrs. Butler & Marshall be accepted. The amendment was carried.

Llanelly.—At a meeting of this Board, held a short time since, drawings prepared by Messrs. Alexander & Henman, architects, of Stockton and Middlesbrough, and Mr. E. Sugden, of Bristol, were chosen from a number sent in in competition for their proposed schools at Brynmawr.

Aberdare (South Wales).—On the 20th ult., this Board met to finally decide respecting the plans sent in in competition for their schools. The designs prepared by Messrs. Alexander & Henman, architects, of Stockton and Middlesbrough, and Mr. E. Sugden, of Bristol, were selected, and those gentlemen have received instructions to proceed at once with the working drawings.

ACCIDENTS.

Destruction of Gildersome Church by Fire.—The parish church of Gildersome, a village about five miles from Leeds, has been entirely destroyed by fire. The outbreak was first seen about four o'clock on Saturday morning, when the flames had already taken too great a hold upon the chancel and the body of the church to be subdued. Even otherwise, there were no means, within easy reach, of extinguishing a large fire. It was several hours before the fire had spent itself. The church was therefore reduced to a complete wreck. The roof fell in, and nothing remains but the four bare walls and a damaged portion of the tower. The church had been reopened only in August last, after improvements which cost about 1,100*l.* This sum had been almost entirely raised, although with some difficulty, among the parishioners. The church itself, which was not insured, is about a century old. The chancel was new, and there was a stained-glass memorial window, the gift of Mrs. Stephenson and family. To the erection of a new church W. J. Armitage, of Farnley, has already promised a contribution of 250*l.* The cause of the fire is not known; but the supposition seems to be that it originated with a gas-stove used to prevent the new organ from becoming damp.

Fall of New Houses in Manchester.—Two new houses which were in course of erection in Dawson-street, Emden-street, Hulme, have fallen to the ground, and buried two men in the ruins. The person who was building the houses was a Mr. Powiss, bricksetter, Mona-street, Vine-street, Hulme. The erection of the cottages commenced three weeks before, and owing to a little favourable weather, the work progressed without interruption. At the time of the accident, the only portion of the builder's contract remaining unfinished was the laying of the roof, and this was being proceeded with when the buildings collapsed. There were eight men employed in finishing the houses, but four of them had refused to resume work on account of the appearance of the houses, the back walls having bulged outwardly. The other four considered that there was no danger, and continued their labours. The back walls first gave way, and the whole fabric fell to the ground, only one of the gable ends remaining standing. At this time two men were working on the roofs of the houses. They both fell with the buildings, and were buried in the *débris*. They were rescued, but were both badly cut and bruised. A third man, who also fell with the buildings, sustained contused wounds on the scalp and cheek. The main walls of the houses were 4½ in. thick, and the "mortar" used is said to have consisted almost exclusively of sand. We decline to call this disaster an accident.

Accident at an Auction.—An alarming accident occurred during a sale of furniture and other property at an old farmhouse near Dore, four or five miles from Sheffield. The auctioneer was disposing of some bedsteads in one of the upper apartments when the floor suddenly gave way, and the company, nearly thirty in number, found themselves struggling in the room below amidst a mass of broken timber and furniture. Fortunately no lives were lost, but several persons were seriously injured. The house has been built many years, the late occupants and their ancestors having resided there for nearly two centuries. The immediate cause of the accident was the giving way of a beam at a point where an iron rivet had been inserted to strengthen it.

Fall of a Factory at Wolverhampton.—The roof and front wall of a lock factory in Wolverhampton, have suddenly fallen to the ground. Fourteen men, women, and children at work in the building escaped almost without injury.

Accident at the London Docks.—The East London Railway Company, for their extension line, lately commenced constructing a tunnel under the eastern dock, at the London Docks, and, in order to facilitate the works, erected a timber platform in the dock, upon which was placed a dredging machine. About twenty men were engaged upon the platform, when it suddenly gave way, throwing the men into the water. Several of them were rescued without injury, but three men, including the foreman, were badly hurt. Three others are missing, and it is feared that they have been drowned.

Fall of a Café into the Sea at Smyrna.—The Smyrna correspondent of the *Levant Herald*, writing under date of the 11th of February, gives some account of a melancholy accident in that town, which had before been briefly noticed. The Café Kivoto, built upon piles over the sea, broke down suddenly during a performance given by a company of acrobats. The proprietor of the *café* says he only sold 108 tickets, but the people saved declare there were 200 persons present. Most of them were of the poorer class, and there were not many Turks there, or young men of respectable families. At ten o'clock a loud cracking was heard, and within five minutes the entire *café* had disappeared under water. The total number of bodies found up to the 11th was eighty, and it was supposed that there were still fifty more in the water. An English captain, two Turkish merchants, a young man of good connexions, an Italian captain, a telegraph clerk, and some commercial clerks, were among the victims.

THE PEABODY DONATION FUND.

THE trustees of this fund have published a report for the year ending the 31st day of December, 1872. In addition to the five groups of buildings already erected and fully reported upon in previous statements, the trustees have now in course of erection on a small site at Bermondsey six blocks of dwellings of concrete to accommodate 72 families. These will cost much less than if built in the ordinary way, but until this mode of construction has been more fully tested, the trustees do not feel justified in spending any large amount of money upon this description of building.

From the statement of accounts, it appears that to the original or first gift of 150,000*l.*, there has been added by interest and rents the sum of 36,733*l.* 4s. 11d., so that the total amount of the property of this first trust is now upwards of 186,700*l.* The net income for the year has been 3,810*l.* 6s. 8d. The properties belonging to the second trust mentioned in the last report, were a site at Chelsea and the Magdalen Hospital Estate, Blackfriars-road. The trustees have since acquired a site of about two acres in Roupell-street, near to Blackfriars and Waterloo bridges, and another of more than an acre and a half in Southwark-street, in close proximity to Southwark Bridge, and within easy access of London and Blackfriars bridges.

It is only on the south side of the Thames that the trustees have lately been able to find suitable plots of ground at a reasonable cost. The experience gained at Blackfriars has shown that buildings in this neighbourhood not only accommodate the labourers engaged in the manufactories on the south side, but from their position are available for those who are so much inconvenienced on the north side of the river, in Westminster and its neighbourhood. Contracts are about being entered into for covering the two new sites with dwellings, and it is estimated that accommodation will thus be afforded for more than 500 families.

The late Mr. Peabody conveyed to the trustees several acres of land at Stockwell. It has been let on long building leases.

The applications for rooms at Blackfriars-road continue to be so numerous, that the trustees have resolved to build three more blocks on this site. Although the dwellings at Blackfriars are greatly superior to those erected at an earlier period, the trustees will be able to give still better accommodation in the proposed new buildings, without increasing the rents. This trust now represents a total of 228,000*l.* The net income during the past year was 7,637*l.* 8s. 3d. Before the close of the present year the sum of 150,000*l.* will be added to this second trust, in accordance with the terms of the bequest contained in the will of the late Mr. Peabody.

The trustees give the following details:—In May, 1872, there were 847 families, consisting of 3,407 persons, occupying 3,328 rooms, which is approximately a room for each individual. The average weekly earnings of the 847 heads of families were about 1*l.* 2s. 4d., and the average charge per room about 1s. 10d. per week.

THE PUGIN TRAVELLING STUDENTSHIP.

AT the last meeting of the Royal Institute of Architects, the chairman announced that of the nine candidates who had submitted drawings and testimonials in competition for the Pugin Travelling Studentship of 1873, the council had elected Mr. Aston Webb, of Duke-street, Adelphi, subject to the conditions prescribed in the Pugin deed of trust, and that the council desired to call particular attention to the skilful execution and number of his sketches.

The chairman, Mr. Horace Jones, added, that the council had determined to mark the unusual excellence of other drawings submitted this year for the Pugin Studentship, by awarding medals of merit to two other candidates, viz:—Mr. P. J. Marvin and Mr. R. C. Page, and by distinguishing with Honourable Mention the drawings of Mr. Thomas Garratt and Mr. Walter L. Spiers.

The drawings and sketches made by Mr. John Sulman, Pugin Travelling Student for 1872, were exhibited in accordance with the conditions of the Pugin Deed of Trust.

THE IRON AND COAL TRADES.

AN illustration of the unprecedented condition of the trade of Wolverhampton is furnished by a circular issued by one of the leading houses, in which the following passage occurs:—

"In consequence of the enormous advance of all raw materials we are reluctantly compelled to withdraw all late quotations of iron for the present, but we shall be glad to quote you specially if you will be good enough to favour us with your inquiries."

At a banquet given by the Sheffield Typographical Society, Mr. Philip Casey, secretary to the South Yorkshire Miners' Association, made some revelations as to the cause of the high price of coal. He said that in 1863 only 11½d. per ton was paid to the miners for coal produced, and since that time they had received 1s. 6d. per ton, which was an advance of 50 per cent. It was reported that the miners were making 10s. a day. Some of them were; but others were making a deal less, and when coals had been advanced from 4s. 6d. per ton to 19s. and 1*l.* per ton at the pit's mouth, the coal-owners must be getting the lion's share. The supply of coal was not equal to the demand, and in consequence the owners were able to push it up to its present price, and the demand had been so great that vendors had offered 4s. per ton over the published prices if the coal-owners would supply it. The colliers of this district had received an advance of about 50 per cent. on 1s. per ton; but that was very different from the case of the owners, who were getting 150 per cent. upon 4s. or 5s. per ton. They must not be

* Mr. Kellett wishes to add 62*l.* to his tender, in consequence of a mistake in his ironfounder's tender, which will make it 5,457*l.*

surprised if the colliers went in for another rise in a week or two. They believed they were entitled to it fairly, and it was not their increased wages which caused the present high prices. It was a fearful and monstrous thing that coal should be sold for 50s. a ton in London, when it cost 1*l.* at the pit's mouth and 8s. carriage; thus the coal-merchants of London realised a profit of 1*l.* per ton upon all they sold.

The Clay Cross miners have passed the following resolution:—

"That this meeting, seeing the serious state of things resulting from the scarcity of coal, pledges itself to attend work regularly."

Since the recent large advance of wages, many of the pitsmen have spent the greater part of their time in drinking, racing, and dog-fighting.

Compressed Irish peat, possessing the density of coal, and well suited for household purposes, as well as manufacturing uses, may be shortly expected in large quantities in the market. New and improved compressing-machines have been perfected, and are expected to be set at work in March, under the auspices of a company established for the purpose of supplying peat for all general purposes.

The men on strike in South Wales have accepted the mediation of Sir Rowland Stephenson, who by this time has doubtless communicated the result of his interview with the masters. It is earnestly to be prayed that work may be speedily resumed.

TECHNICAL EDUCATION IN SCOTLAND.

A COMMITTEE appointed by the Town Council of Edinburgh have recommended to the governors of Heriot's Hospital a scheme for a complete system of theoretical and technical education, which consists of a school for boys between twelve and fifteen, and an evening technical college for adults and apprentices. Meetings have recently been held at Dunse, Kelso, Lauder, and other places, where resolutions have been carried recommending the School Boards of Scotland now in course of election to consider how the elements of science and drawing can be introduced into Board schools. The Rev. J. Macleod, the Rev. J. Bell Middleton Nisbett, and other ministers of the Established Church, have taken a warm interest in the meetings.

At the last meeting of the governors of Heriot's Hospital, a letter was read from Miss Blyth, secretary to the Society for the Employment of Women, urging that, should the governors agree to establish a technical school in Edinburgh, provision should be made for imparting technical education of certain kinds to women. For some time past technical instruction of a useful kind, and especially in the use of the sewing-machine, has been imparted to girls in at least two of the Heriot out-door schools, and with gratifying results, and Councillor Mitchell is, we understand, moving to have the whole of the out-door schools supplied with sewing-machines. Should this be accomplished, a large number of girls in the families of the working classes of Edinburgh will soon be put in the position of being able to earn a livelihood so soon as they leave school.

"THE EFFECT OF CHARCOAL ON PLASTERING."

SIR,—Your correspondent, "John Davidson," in answer to "L. L.," would be a very clever man if he could set an *old* ceiling with *pure* coarse plaster of Paris and *pure water*, and would be deserving of a medal made of the same material, and would be the only member of the large family of plasterers (if he is one) that could accomplish such a feat, as good pure coarse or fine plaster sets, when gauged with *pure water*, in about two minutes; in fact, would get as hard as a brick before he could spread one trowelful, and the suction in an old ceiling would be so great as to prevent the spreading; also, even if it could be done, the old ceiling, being highly impregnated with the sulphuric acid, would soon bleach through, and the plaster being porous, it would soon absorb a large amount of the gas, so that the remedy he suggests would be as bad as the disease.

Having condemned his suggestion, allow me to make one. If, as "L. L." states, the ceiling is in a bad condition, remove it, laths also, if unsound; re-lath it, painting the heads of the nails to prevent corrosion; then render it in one coat in Keene's or Parian coarse quality; two of and, washed *free* of organic matter, to one of cement, with about the same amount of clean sow-hair as is put into lime and hair; then, when hardened, set it with pure white Keene's or Parian cement gauged with *pure* water, and as this does *not* set quickly it gives time for trowelling, and with plenty of elbow-grease introduced into that operation the surface becomes a polished one: therefore the gas would not attach to it as to a rougher surface; and, being a pure white, it would require neither painting nor whitening, as the sulphuric acid gas soon turns them a brownish yellow. *If* at any time it should discolour, it can easily be removed by the application of clean hot water and American potash, applied with a soft brush or house-flannel. At the same time, I would recommend the introduction of one or two perforated zinc ventilators, according to the size of the ceiling.

WILLIAM PULHAM.

SIR,—As Mr. Davidson has mentioned, in his letter under the above heading in your last issue, that Martin's cement might be used for the ceiling in question, "or a coating of the same, from ¼ in. to ½ in. thick on the surface of the ordinary plaster-work," allow me, as the manufacturer of this cement, to say that to use it in the manner described is not at all to be desired. The under coat, formed of common lime (carbonate) and sand, would not assimilate with the finishing coat; consequently the latter would shell off, to the annoyance of all concerned.

I would suggest that for the particular purpose now required, slabs of equal parts of Martin's cement and clean sand be formed, about 1 in. thick, with copper wire or wire-gauze embedded in the middle. When sufficiently dry, these might be screwed up to the timber of the roof, and then finished with pure cement, forming a strong fire-proof ceiling, which would not be likely to crack. Plaster would not stand for any length of time.

J. C. PART.

SOCIETY OF ARTS' GRATE COMPETITION.

SIR,—Now the Society of Arts have offered prizes for newly-constructed grates for the "economical use of coal for domestic purposes," I beg you will kindly insert the following questions, which, I have no doubt, have presented themselves to other intending competitors as well as myself.

Is it requisite for a competitor to take out a "patent" or get his grate "registered" before he can be absolutely protected from infringement? If not, who is responsible for the protection of all the grates sent in for competition, and preventing other people from taking out a "patent" for any one of them before the prizes are awarded?

I trust that among the numerous readers of your journal some one will be good enough to reply to the above questions for the benefit of competitors.

J. M. GRIFFITH.

THE BRIGHTON AQUARIUM.

SIR,—Being at Brighton on Saturday last, of course I visited the Aquarium, and need hardly say, it being my first visit, that I was much interested with what I saw; however, not being a *student* of the inhabitants of the "vasty deep," my attention was soon directed to other objects of interest, which were not a few. That claiming my preference, and which led me to write you, was the very attractive reading-room. When away from home, one feels very forcibly the value of the "press;" and no place is I think of more value to the adult population than a public reading-room. Its tendency is to widen thought, and to bring opposite parties to see that oftimes they are not so different in spirit as in method. Who can calculate the amount of force lost to progress from prejudice, and ignorance of the true spirit animating those differing as to means? This reading-room at the Aquarium was the only one I had an opportunity of visiting while at Brighton; and being desirous of seeing my *Builder*, I asked the attendant for it, not seeing it on the tables. Fancy my surprise at learning "it was not taken in"! A public reading-room, "liberally supplied with magazines and newspapers," and yet to be minus the *Builder*, seemed to me an anomaly.

I should like to note with satisfaction the course taken by the directors in opening the institution on Sundays; the good behaviour and pleased faces of many, evidently come from the surrounding country districts, struck me as calculated to allay any fears that many might have entertained as to the result of the Sunday opening.

Worcester Park, Surrey. MARK H. JUDGE.

DEFECTIVE SLATE CISTERNS.

HILL & CO. *v.* GREEN AND ASHTON.

IN the Lord Mayor's Court, on Tuesday, a muster seldom seen there of architects, surveyors, and builders, were present as witnesses in the case of Messrs. Hill, Keddell, & Waldram, who sued Messrs. Green & Ashton, slate merchants, for breach of contract, and for 24*l.* 9*s.* 8*d.* damages.

Mr. Willis was counsel for the plaintiffs, and Mr. Talfourd Salter and Mr. Kempe, barristers, appeared for the defendants.

In answer to the questions put by the counsel, Mr. John Waldram stated, that in the early part of 1872 he contracted with Ashton & Green's firm to erect a large slate cistern for a manufactory in Farringdon-street, City, and the contract price was to be about 28*l.* After the cistern was erected their firm received several complaints that the cistern would not hold the water, and they referred these complaints to Messrs. Ashton & Green, and applied to them to make good the defect, and properly carry out the contract they had entered into. Upon this Messrs. Ashton & Green sent one of their men, who made some patching alterations, but which did not effectually prevent the leakage; and upon being applied to again to make a good job of the cistern, they paid no further attention to the matter; and as the escape of water was causing damage and inconvenience, they (plaintiffs) were compelled to have the cistern made good, at an expense of 2*l.* 9*s.* 8*d.* Extra expense was incurred consequent upon being compelled to remove the roof of the building, a difficulty the slaters had not to meet when the cistern was first erected.

It being intimated that the defence to the action would rest as to whether the fault did not lie with the builders in not preparing sufficient underneath support for the cistern, the evidence upon this point was the chief contention on both sides.

Mr. Gunning, architect, said he remembered seeing the cistern put up by the defendants' men, and the bearers were, in his opinion, strong enough to hold twice the weight of water the cistern held. He considered that the leakage arose from the sides of the cistern not being properly grooved into the bottom, so that when three tons of water were in the cistern, the pressure forced the bottom to give way, and being only supported by the bearers instead of its own strength, which should have been the case, the leakage would arise at sides and bottom.

Mr. Gunning's views were backed up by several practical men, and Mr. Hayward, who made a good job of the cistern, stated that he found the grooves and joints in the slate filled with cement instead of being properly hollowed out, as such a strong job required. He considered the bearers sufficiently strong and close enough to hold twice the size of the cistern.

A witness also deposed that the cistern leaked the first day water ran in, and at the depth only of 1½ ft.

Counsel for the defendants, and several architects, builders, workmen, and slate masons, on the other hand, stoutly urged that the job was performed in a workmanlike and tradesmanly way; that the beams did not sufficiently support the cistern which had been fixed on two bars of iron which were too far apart, and the weight of water had strained the middle and caused the leakage; that when Mr. Hayward was called in, he noticed this defect, and had another bar placed in the centre, and when this was done the leakage ceased. The defendants further contended that it was no part of their contract or duty to look after the supports of a cistern. All they engaged to do was to erect the cistern, and if the whole building fell down when the water filled the cistern, they would not be liable for the damage, and that it was the place of the party who ordered the cistern, to see that the beams were placed in correct position.

In answer to this view of the matter, Mr. Willis urged that the contract was to supply a cistern fit for the use it was intended for, and to hold water, and this had clearly not been done; and the defendants not having carried out this agreement, they were liable to the costs incurred by the plaintiffs in making good the defects.

The Deputy Recorder, Sir T. Chambers, M.P., was stopped in his summing up by the jury returning a verdict for the plaintiffs for the full amount.

A WRINKLE FOR HOUSE DECORATORS.

DUNN v. Burke.—This action was brought, in the Westminster County Court, by a builder and house decorator, of Brewer-street, Westminster, against Lord Burke, of the Albany, Piccadilly; and the sum sought to be recovered was 15*l.* 7*s.* 4*d.* for work done under contract, and for extras.

From Mr. Dunn's statement, and his witnesses, it appeared that last October Mrs. Hanson, housekeeper to the defendant, applied for an estimate for whitening the ceilings of the chambers in the Albany, and for some repairs of the bath-room.

Previously to supplying the estimate, the plaintiff's foreman acquainted the housekeeper that, before the work could be proceeded with, it was necessary that the rooms should be cleared of pictures, furniture, &c.; and she was asked if the making of these preparations were to be included in the estimate, and Mrs. Hanson said it was not.

After the estimate had been forwarded, the housekeeper informed the plaintiff that Lord Burke had agreed to it, and that the work was to be proceeded with directly. Upon the foreman taking the men to the job, he found nothing had been removed to make way for the workmen, and he again told the housekeeper it was necessary that the pictures, clocks, and furniture must be taken out of their way; when the housekeeper said she was unable to remove the things, and that the workmen must do it. The foreman told Mrs. Hanson that this labour was not provided for in the contract, and that if the workmen did it extras would have to be charged; and the housekeeper said Lord Burke must pay for it, of course. The work contracted for took up 116 hours. Upon the bill being sent in Lord Burke refused to pay more than the estimate, and offered 11*l.* 10*s.*, which Mr. Dunn refused to take.

Several decorators were called to speak to the custom of the trade charging for dismantling, when not set down in the contract, and that the charges were fair and reasonable.

Lord Burke said he was the eldest son of the Marquis of Clanricarde, and occupied chambers in the Albany. By his direction his housekeeper applied to Mr. Dunn for an estimate for whitewashing a sitting-room, bedroom, dressing-room, and bath-room, and to make good a broken ceiling.

The estimate provided that the walls should be covered, to prevent damage to the pictures, looking-glasses, and book-cases, and this was provided for in the first item of the contract. He afterwards directed that two carpets should be taken up and beaten, and a door cased. Upon the delivery of the account he objected to the extra charge of 5*l.* 15*s.* 6*d.*, as he contended that these were included in the contract, but offered to pay for beating the carpets and altering the door, and upon asking the plaintiff's foreman what this was worth, he said 30*s.* would amply cover it. He desired the foreman to take the bill back, and get the items he disputed struck out, but he refused to do so. He then sent it back, stating that he would not pay for the dismantling. The articles in the rooms were not so numerous as to require 127 hours to do it, even if each were removed. He had tested the time by removing one picture from one room to another in five minutes; and as only about forty articles were removed, it would only occupy three hours altogether.

Mr. Reed, house decorater and upholsterer, said he had gone over the chambers and the contract, and he should have thought the sum of 6*l.* 13*s.* would have amply repaid the plaintiff for the whole of the work done. He should have been glad to do it for that payment. There was no need to remove the things. They could have been covered up.

Mr. Atkinson, for the plaintiff, said his client had

received a letter from Lord Burke, of a threatening nature, and Mr. Dunn had no choice but to bring this action, to show that he had in no wise imposed upon the defendant. He urged that the orders of the housekeeper to the foreman were binding upon Lord Burke, and that the plaintiff was clearly entitled to the whole amount.

The learned judge, Mr. F. Bayley, said he did not concur with the learned counsel; for, from the evidence of Mr. Reed, there was no necessity to remove the furniture, but simply to cover it over, to prevent the whiting spoiling it, and that was clearly provided for in the contract. He thought the sum paid into Court, being the contract sum and for beating the carpet, was all the defendant was entitled to pay, and his verdict would be for the defendant, with full costs of counsel, attorney, and witnesses.

THE TEMPLE OF DIANA, EPHESUS.

FOLLOWING up the information already made public through our pages and elsewhere, Mr. J. T. Wood has forwarded particulars of his recent discoveries on the site of the Temple at Ephesus :—

"The first two stones found this season were from the ante of the Pronaos, and represent two male figures in combat, the muscles of the chest of the most entire figure being highly developed; both figures are in very high relief, and perfectly nude. One or two less important fragments of sculptured drums of columns have also been found, and recently one very large fragment of a drum with the upper halves of two nude male figures in high relief. The figures are those of a bearded man leaning on a staff, and regarding with interest some object held in the hands of a younger, beardless man.

In respect to the probable height to which the sculpture on the columns was continued, I am of opinion that they were sculptured to the height of one-third of the shaft, and I believe one of the stones now in the British Museum, which certainly was not one of the lowest stones of the column, proves that there must have been at least two; the proportion, however, shown on coins representing the front of the Temple is about one-third sculptured, as nearly as I can remember. The extra width of the intercolumniations where the sculptured columns occur also goes far to prove that the sculpture was continued for a considerable height up the columns.

The masonry which supported the ten steps has been found comparatively undisturbed on the north side, and the entire width of the whole, measured on the lowest step, was 238 ft. 4 in., the Temple itself measuring 163 ft. 9 in. by 308 ft. 4 in.

The two columns *in situ*, the portions of walling of the 'cella' remaining, and the impression of other portions which have been removed on the rubble masonry, the masonry supporting the steps, from which buttresses were built opposite the foundation-piers of the columns, have enabled me to complete the plan of the Temple, which is now found to have been octostyle,—that is, having eight columns in front, and adorned externally with 100 columns nearly 6 ft. in diameter. The interior of the 'cella' must have been enriched with two tiers of columns of smaller diameter, as fragments of these were found near the walls.

The thirty-six sculptured columns (*columæ cælatæ*) were, doubtless, placed at the western and eastern extremities of the Temple, as proved by the wider intercolumniations, thus allowing for the high relief of the sculpture, as found in the examples recently discovered.

Since writing I have discovered a large drum of a sculptured column at the extreme eastern extremity, with remains of six human figures, life size. It is thus proved that I was correct in supposing that there were sculptured columns in the rear as well as in the front of the Temple.

Another question is also settled by this last discovery, viz., the fact of the columns having been sculptured to a greater height than 6 ft., or one drum only. I have supposed that the sculpture was continued for at least one-third the height of the column. The diameter of the drum now found is 5 ft. 7½ in.; that of one of the others is 6 ft. 9½ in. This diminution in the diameter of the drums proves that the last found was not the lowest drum of the column, nor even the one directly above the lowest."

PRE-HISTORIC FORTIFICATIONS.

IN a lecture delivered a short time back at St. George's Hall, Langham-place, on "Pre-historic Fortifications and the Military Engineering of our Ancestors during the Stone Age," Mr. Lawson Tait said, everywhere we find traces of that rude life long anterior to the existence of civilisation. There may be distinctly traced the stages of the stone, the bronze, and the iron ages, as points of development in man's history; while other countries, not having made such advances, and having flourished as long, are only still in the stone age—all their implements being of stone. The state of a nation's warfare was a sign of its advancement, and this was exemplified in the construction of forts.

The earliest instance of armoury that we know of, was that of a chip-flint pebble, which was used either by being attached to a stick, or else clutched in the hand. The natural positions of defences used by our ancestors were those of an elevated character, and so in the construction of forts, the earliest and rudest of which were hill-forts. They were first constructed simply as places of refuge, and were made upon little table-lands. Afterwards we find that in the erection of these forts the masonry improves, and small oval chambers are introduced; then they become regular places of residence. In the county of Sutherland many of these forts were built entirely of stone, though earth-forts preceded them, and so were constructed on positions which were naturally strong. A remarkable feature in the construction of forts is that they were invariably built in sight of one another, and, by a system of telegraphy, the men in occupation could be on the alert in case of foreign invasion. One of these forts, situated in the Orkney Islands, stood a siege for nearly six months. Its shape resembled that of a dice-box, and it was built entirely of dry stone, no cement whatever being used. In some instances, the stones of which these forts were built must have been carried some miles' distance, and the industry displayed by the builders must have been enormous. Many of these forts are preserved to us now in consequence of the difficulty there is in destroying them, they being so substantially built. At Inglebury, in Yorkshire, there exist the remains of one of these forts, built on the top of a hill, which covered an area of thirty-one acres, scientifically inclosed by means of ramparts. In different parts of the Yorkshire hills, too, trenches have been cut some thirteen and fourteen miles in length. These and other defences evince in our ancestors not only an amount of engineering skill, but an enormous amount of patience; and considering the inefficiency of the implements they employed, these works must have involved a considerable amount of labour.

THE TRADES MOVEMENT.

Bradford.—In November last the masons of Bradford gave their employers six months' notice that at the expiration of that time they would require an advance of 3s. per week. Negotiations since carried on have terminated in a mutual arrangement between employers and employed. The masters agree to give their men an advance of 2s. per week upon their present rate of wages. The advance will come into operation in May next.

South Shields.—The joiners employed at the shipbuilding yards of Messrs. Redhead & Co. and Messrs. Softley & Co., have struck work for an advance of 3s. per week.

Airdrie.— At an adjourned conference of painters held between employers and employed it has been unanimously agreed by the employers to advance the present rate of wages from 6½d. to 7d. per hour, and the country wages from 3s. to 4s. per week.

Dunfermline. — The operative joiners and cabinetmakers have applied for a rise of wages to the extent of ¾d. per hour, and intimated to their employers that they will come out on strike, after giving a fortnight's warning, if it be not granted on the 1st of March. The non-society men have given their consent to this resolution. Two of the masters have given a favourable reception to the demand. Certain by-laws for the regulation of all disputes connected with the trade have been submitted for consideration to the masters.

SANITARY MATTERS.

Nantwich.—The rural sanitary authority have appointed a sanitary inspector, with a salary of 300*l.* per annum, but who is expected to act as surveyor for the sewerage works. There were about 120 candidates, which number was first reduced to seven, among whom were Mr. J. S. Hodgson, Mr. Crees, Mr. Parry, and Mr. Maylo, to all of whose testimonials the chairman made special reference, and who, he said, were all men acquainted with sewerage. Mr. J. A. Davenport, of Over, said by Mr. Bailey Denton to be a good surveyor, was elected.

Berkshire.—An adjourned conference of the various sanitary authorities in Berkshire on the New Public Health Act, respecting the appointment of an officer of health under that Act, has been held at the Assize Courts, Reading. Mr. R. Benyon, M.P., presided. Mr. Henley, the Poor-Law Inspector, was also present. The delegates from the following sanitary authorities within the county of Berks signified the assent of the authorities they represented to the principle of combination in the appointment of the medical officer of health :—Abingdon (rural and urban), Bradfield, Cookham, Speenhamland, and Newbury rural, Newbury urban, Hungerford, and Wallingford, both rural and urban. The sanitary authorities for Windsor, both rural and urban, have not yet met, and the remaining sanitary authorities in Berks either positively declined or only assented to combination to a very limited extent. Resolutions were passed by the delegates of the assenting sanitary authorities, agreeing to appoint one officer of health for the whole of these districts, at a maximum salary of 800*l.*, the payment to be apportioned according to the rateable value of property in each district. A committee was appointed to carry out the details, consisting of the delegates from the assenting districts.

Newark.—A meeting of the sanitary authorities of the town of Newark and the county, convened at the instigation of the Inspector of the Local Government Board (Mr. Baldwin Fleming), has been held in the Drill-hall, Newark. Mr. Neville, of Sturton, was elected chairman, and there were present representatives from the following bodies :—Borough of Newark Improvement Commissioners, Mansfield Improvement Commissioners, Grantham Union, Radford Board of Guardians, Newark Union, Southwell Union, Worksop Union, Sutton-in-Ashfield Local Board, Mansfield Woodhouse Local Board, Basford Union, Hucknall-under-Huthwaite Local Board, Bingham Union, Hucknall Torkard Local Board, &c. Mr. Fleming addressed the conference at some length. In the course of his observations, he said the Government consented to repay one-half the salaries, in order that the burden might be lessened to the ratepayers; but they said if we repay this money,—

"We must have some guarantee that the officer is an efficient and independent officer. For that reason we must keep in our hands the power of saying we shall not approve an appointment unless we have evidence that the person proposed is fit to hold the office, and we must also keep in our hands the power of refusing to allow the dismissal of an officer, unless there are very good grounds for it."

These were the only conditions made by Government, and he believed there was no idea of centralisation, or any desire to obtain undue power to interfere with local authority. It ought to be distinctly understood that, according to the provisions of the Act, the officers of health would of themselves have no power to prosecute. They could only act on the instructions of the authorities by whom they were appointed, and those authorities took action on the reports that were made to them. There was no intention on the part of the Legislature of adding materially to the burdens of the ratepayers by compelling the local authorities to make the appointments in question. What they hoped was to reduce the preventible diseases to a minimum, and thereby greatly to lessen the burden which now fell upon the rates. It was not desired that the inspectors of nuisances should unnecessarily intrude themselves anywhere. After a lengthened discussion, Mr. W. Beevor proposed,—

"That in the opinion of this meeting it is desirable that a medical officer of health should be appointed for a large area, that he should be required to devote his entire services to the office, and that such a salary should be given as would command the services of an able, efficient, and independent man."

Mr. B. Walker, of Lenton, said that he should like to have an expression of opinion as to whether it was desirable to unite into large districts or not. He therefore moved as an amendment,—"That each district act according to its own judgment on the subject." Mr. Godber, of Balderton, inquired whether the Local Government Board would so far disapprove as not to allow each separate sanitary authority to appoint a medical man acting and practising in the district. Mr. Fleming: You have the power to appoint whom you like, providing he is properly qualified. The question was then put to the vote, and the original motion was carried by a majority of nineteen to fifteen.

THE CHAPEL AND HALL, WINCHESTER COLLEGE.

SIR,—Your correspondent, "D," in your last week's impression, concludes his letter,—"Now if the authorities really cannot afford these works of restoration, they ought instantly to open a subscription for the purpose." And "every one who knows Winchester College, must see that they have not sufficient funds, &c." It may interest "D," and others who may not know the facts, to be informed that Winchester College is one of the richest corporations in the kingdom; that their present income is 20,000*l.* a year, or more, and is increasing every day. At the present moment the college is said to be under commissioners, who are responsible, but who certainly do not take any active measures for the improvement of the college buildings, or their landed estates, dotted as they are over nine counties. Nor are the college funds much entrenched on by liberal contributions to schools, or public

charities in the parishes where the property is situate, the annual subscriptions seldom exceeding a *very few* pounds.

There can now be no reason, as formerly existed, for colleges and such like institutions to hold landed estates. And when it is known what a bar to improvement these properties frequently are—never managed as other estates,—the sooner the commissioners have power to sell their estates (without being obliged to re-invest in land), the better it will be for the colleges, their lessees, and the public generally.

The funded property of this college, I am told, is nearly 100,000*l.** So want of money cannot be urged as a reason why everything connected with this property should not be well done, and done at once.

NORTH HANTS.

FRESCO AND MURAL DECORATION.

THE Committee of the Council of Education have announced their intention of awarding a number of prizes for the best copies of any good examples of fresco or other wall-painting existing in the United Kingdom in connexion with ecclesiastical and other buildings. Information is also desired as to the former practice of mural paintings in these countries, and the artists who were engaged in the pursuit. Those supplying the information are required to state the name of the church or other old buildings on the walls of which the painting exists, the name of the town and county, whether in tempora, fresco, or oil; the size, the name of the artist if known or probable name, date of the work or probable date, name of any printed work [or manuscript] containing a description of the above.

The head-master of the schools of art in connexion with South Kensington will send circulars through the country detailing the particulars of the competition, and with a view of obtaining all possible information upon the subject. Some of our readers may help.

THE EMBANKMENT FROM CHARING CROSS.

SIR,—Should Northumberland House be removed, and should an opening be made through its site to the Embankment, I will presume that (especially if the trees at the two sides of the avenue so laid open be retained) a magnificent opportunity will arise for looking down such avenue. But must not the expense of destroying the house be supplemented by the further expense of providing an object to be looked at as the termination of the vista? The river Thames will, in perspective, be reduced to insignificance, if not hidden altogether behind parapets. Are the Metropolitan Board prepared to lay out a few thousands in the erection of something like an Albert Memorial on the Surrey shore?

G. M.

THE ROYAL GOLD MEDAL.

SIR,—Your correspondent "M. I. B. A." drew attention in your last issue to the proposed award of the Royal Gold Medal to Mr. T. H. Wyatt, and in a temperate and forcible manner pointed out the impropriety of the proposal, and indicated some of the ill results which will ensue if the ecommendation of the Council be confirmed by the Institute.

I fully anticipated when the announcement was first made that it would elicit some remarks from the professional journals, but as far as I have seen the letter of your correspondent is the first public notice that has been taken of the matter. This reticence in all probability arises from a desire to avoid any apparent disparagement of Mr. Thos. Henry Wyatt, who is universally esteemed both as an architect and a gentleman.† It is not, however, in any sense a personal question, but entirely a question of policy, and may, to divest it of all appearance of personal feeling, be put in this form: "Is it right for a public body, intrusted with the duty of advising her Majesty as to the bestowal of a mark of distinction, to nominate their own president for the time being for the honour?" The answer to that proposition must be in the negative. What would be thought of a Cabinet which advised the sovereign to confer a vacant Garter upon the Minister at the head of the Government? Such a course would be naturally considered improper and unbecoming, and yet it is precisely similar to the action of the Institute. Should architects have any less standard of honour than statesmen, or is there one code of honour among politicians and another for professional men?

The Royal Gold Medal is one of the few distinctions which fall to the lot of our profession, and it is important that this distinction should be distributed impartially, and that it should not be confined to a clique, nor be used as a reward for services to the Institute. The Council of the Institute are merely trustees of the Royal favour, and it is an abuse of that trust if they restrict their recommendation to Her Majesty among their own members, or allow any personal feeling or favour to influence their decision. Some of the later awards of the medal have been certainly open to question; but we have not had hitherto such a flagrant instance of official nepotism as the present proposal, and I trust that the profession will show its feeling with sufficient distinctness to induce the Council to withdraw their recommendation.

As I before remarked, the president of the Institute is in every sense an architect and a gentleman; and I can scarcely credit that he approves the action of the Council. I cannot believe that a man of his sensibility could accept the highest distinction awarded to his profession from the hands of his sovereign with any satisfaction to himself under the present circumstances.

CIVIS.

LEAD PIPES AND FROST.

SIR,—As a subscriber of more than twenty years, I have not read your pages without seeing many suggestions for preventing the bursting of water-pipes by frost; but none of them appear to find much favour, as the evil still wants a remedy.

I will venture to affirm that the suggestion mentioned in your last issue as finding favour in a discussion at the Inventors' Institute will not be much used, although there cannot be a doubt of its practical efficiency. A small india-rubber tube inside the ordinary lead-pipe need not be very costly; but it would puzzle many a workman how to finish off the end near the tap, or how to make a junction if the pipe branches.

If you think the following suggestion worth inserting, it is at your service. I would have made it some years ago, but should have preferred to know how it succeeded in practice.

Let an ordinary lead pipe be passed through a pair of rollers so as to flatten it slightly; the expansion of water within it during frost will only tend to bring it to a circular shape, and probably it will require many severe frosts to accomplish that, for even in lead there is some elasticity. An iron (wrought iron) or zinc pipe would probably always resume its flattened shape, after the frost is over. Other sections besides the elliptic might of course be applied—as half-round and three-quarter round, with a flat side to the wall. These sections for water or gas pipes would be far neater in appearance than the circular shape now universal.

F. H. M'LAUCHLAN.

CHURCH-BUILDING NEWS.

East Stoke.—The chancel of East Stoke Church (near Newark) has been restored, at the expense of Sir Henry Bromley, bart. It had a level plastered ceiling, high pews, and rough stone paving, the extreme end only of the chancel being raised one step above the floor of the nave. The improvements consist of new plinth and facing to a portion of the exterior, with eaves, gutters, and rain-pipes, a chancel archway with moulded jambs and bases, and carved capitals; a stone screen, with moulded quatrefoil perforations and coping, two ornamental panels inserted in the western spandrels of the arch, and an oak door and frame with moulded and carved stone dressings on the north side. There are now five steps, including the altar, of red Mansfield stone, with inlaid encaustic tile risings and rounded nosings. The floors are laid with Minton's tiles; those of the Sacrarium being the gift of Captain Bromley, R.N. The plastering has been removed from the interior, the wall-stones pointed, the tie-beams and king-posts cut away, the principals cross-braced and secured with iron tie-rods. A polygonal moulded and panelled ceiling is formed of pitch-pine. There are an oak altar-table and pitch-pine open sittings. The book-rests to front seats are supported on iron standards. These improvements bring out the fine proportions of this chancel, and show the tracery in the east window, previously hidden by the plastered ceiling. The gallery is removed to the west end of the nave, and the tower archway opened out and restored. The works were carried out under the direction of Messrs. Hine & Son, of Nottingham, by Mr. R. Young, of Lincoln, builder; the carving was by Mr. J. M. Thompson, of Nottingham.

Lightcliffe.—The parishioners of Lightcliffe have had a liberal offer made to them, at a meeting, by Major Foster, of Cliffe Hill. There being obstacles in the way of building on or near the site of the present church, the major offered a site for a new church on a portion of his own park, more conveniently situated for the parishioners at large, and to build the church at a cost of at least 5,000*l.*, capable of accommodating from 400 to 600 persons (a third of the sittings to be free), trusting to the parishioners to provide a clock, peal of eight bells, and an organ. The offer was most heartily received by all present, and they promised to do their part in the work.

VARIORUM.

"THE Newspaper Press Directory and Advertisers' Guide. 1873. Mitchell & Co., contractors for advertising, Red Lion-court, Fleet-street."—This is the twenty-eighth annual issue of a very useful periodical. Besides containing full particulars relative to each journal published in the three kingdoms, it contains a directory of newspaper proprietors and a newspaper map of the United Kingdom, with a directory of magazines, reviews, and periodicals; and many newspaper advertisements.——"Dulwich College and the Endowed Schools Commissioners. A tract for the times. By John R. Adams. London: Davidson, High Holborn." This tract enters pretty fully into the affairs of Dulwich College, and treats of the merits or demerits of the authorities. The author thus sums up his conclusions:—"The noble foundation of God's Gift College at Dulwich ought to be for ever applied to the uses for which the founder designed it, and which, in framing the scheme which was sanctioned in 1857, the Charity Commissioners respected. We do not mean to say that the scheme of 1857 needs no amendment; on the contrary, we think that in many points it could and ought to be much improved; and in conclusion we will here indicate the points alluded to.

"1. The governing body should be remodelled, and its powers for evil checked, as to leases and management of property, and as to the exaction of high fees for education.

2. Such an organisation of the schools, by means of departments and otherwise, should be enforced as will spread the benefits of the endowment over the widest possible area, and in the best possible way, in conformity with the light of modern times, and not in slavish obedience to ancient notions.

3. In particular, by means of a school or college devoted to the subject, technical instruction of the most ample kind and character should be afforded.

4. The tuition fees should be fixed as low as possible,—the rates named by Canon Robinson and Mr. Latham are ample,—and the endowment used to supply what the fees do not pay.

5. Local schools should be established in the parishes now entitled to the benefits of the endowment, according to their several needs, having regard to existing means of education in the respective localities.

6. Girls' schools of every grade should be established as soon as possible, at the low scale of fees mentioned by Mr. Fearon.

Generally, the endowment should be so used as to carry out substantially the presumed object of all endowments, namely, to help those who need help, and not those who boastfully disclaim all desire or intention of participating in charity."

——"Light Railways and Tram-roads,—their Advantages, &c. By Arthur C. Pain, Assoc. Inst. C.E. The *Field* Office, Strand." The author of this tractate treats of the advantages of light railways to landowners, the cost, mode of construction, and working, with remarks on the raising of the necessary capital. This is an important subject, to which we have already given repeated attention.——"An Essay on Astro-Meteorological and Political Sciences, entitled Coal-Mine Explosions, and their Cure; including a Warning to Rulers. By W. Carr Ash. London: W. C. Ash, 8, Eton-road, Eton Park, Haverstock-hill." This author is of opinion that,—

"Coal-mine explosions are caused by two opposing elements, hot and cold air, coming in contact, or in collision, the result being an explosion, and, consequently, a flame,—or lightning, for, by a wrong system of ventilation, the coal-mine becomes a species of volcano."

* I know this as a *fact* from private sources.

† Quite right, so far as we are concerned. We feel strongly the force of the objection taken, but are not willing to say one word in disparagement of Mr. Wyatt's claims.

Though these catastrophes may be prevented, he adds, and coal-mines rendered as safe to work in as stone-quarries, yet the men must be taught the truth, that all the science in the world will not prevent accidents that may be caused by folly, carelessness, or indifference, to prevent which rigid rules are necessary. The author has special ideas as to the aurora borealis, which he insists on treating as plural in the singular number, and he also deals with a variety of subjects, such as pauperism, politics, and political economy; predicts events such as that the Prince of Wales is "destined to reign," &c.; and seems certain that Britons are descended from the lost tribes of Israel, and have a grand destiny to accomplish.——"Report to the City Sewers Commission on Railway and Tramway Projects. By W. Haywood, Engineer and Surveyor to the Commission. January 17th, 1873." In this Report to the Finance and Improvement Committee of the City Sewers Commission, Mr. Haywood treats of the railway and tramway projects before Parliament in the present session, as they affect the City of London. The following is a list of them:—City and West End Railway, Metropolitan Railway, Midland Railway (Additional Powers), East and West Metropolitan Junction and Cannon-street Railway, North Metropolitan Tramways, and New Mint Building Site. The railway projects will interfere with the sewerage, he states, and ought to be dissented from in order that the interests of the public and the City authorities may be secured. The New Mint site is the same as before, on the Thames Embankment, near Temple-street and the Gas Light and Coke Company's premises.

Miscellanea.

A New Safety Lamp.—A patent has been taken out by Mr. William Yates, of Westminster, modifying the old lamp in the following way:—He has removed the wire gauze from that part of it which surrounded the flame, and replaced it by a strong lens or bull's-eye glass on one side, and a silver reflector on the other. The result of this arrangement is that his lamp gives "a cheerful light, estimated at twenty times that of the old Davy, and sufficient for all necessary purposes." The lamp is easily opened, but this cannot be done without at the same time withdrawing the wick and extinguishing the flame, and it thus becomes impossible to obtain a light by opening the lamp. There are other improvements obviating objections to the old lamps. Mr. W. Galloway, we may here remark, has found that a sound-wave is capable of causing the flame within the wire-gauze cage of a safety-lamp to be transmitted to the external explosive atmosphere. This tends to show that the firing of a shot in a colliery may determine an explosion, not by actual communication of flame from the gunpowder, but solely by transmission of the sound to a safety-lamp placed in a dangerous part of the workings.

The Fever from Infected Milk at Leeds.—Dr. Robinson, the medical officer of health for Leeds, has just presented his sanitary report to the Town Council, and in this document he gives full particulars of this peculiar dissemination of the epidemic, which he traced to milk used in common among those attacked; and on tracing the milk to the dairy, he there found typhoid fever very prevalent and fatal in the farmhouse, part of which, open to the sick apartment, formed the dairy, under circumstances which showed clearly how the contamination of the milk arose. He says, no fewer than eighty persons who had obtained this milk, which was of "superior quality," as evidence proved, were attacked by fever, and of this number fourteen died. At Armley, near Leeds, there has also been an outbreak of typhoid fever, and into this epidemic a special investigation has been made by Dr. Ballard (one of the medical officers of the Local Government Board, and who has had previous experience in milk poisoning at Islington), and from whom a report is shortly expected.

Rateable Property.—For all England and Wales the amount of the gross estimated rental, under the valuation-list in force at Lady-day, 1871, was 126,473,924*l.*, and under the list in force at Lady-day, 1872, 129,038,976*l.* The amount of the rateable value, under the valuation-list in force at Lady-day, 1871, was 107,398,242*l.*, and under the list in force at Lady-day, 1872, 109,447,111*l.*

Obstruction of Light. — An arbitration has taken place in the New Music-hall, Sheffield, before Mr. M. E. Hadfield. The parties to the arbitration were Mr. William Horridge, horn, stag, and scale merchant, Barker-pool, and the Music-hall Company, Limited. The arbitration was for the purpose of ascertaining the amount of loss which had been, and would be, sustained by Mr. Horridge in consequence of air and light to his works being obstructed by the erection of the New Music Hall. The company, by the order of reference, had admitted their liability to pay damages, and the only question to be settled was the amount which they were to pay. Several witnesses gave their evidence; among whom were Mr. Abbott, of Flockton & Abbott, architects for the music-hall, and Mr. Jenkinson and Mr. Fowler, architects. Mr. Jenkinson estimated the depreciation to the factory at 288*l.* and Mr. Fowler at 158*l.* The arbitrator promised to give his decision on a future day.

Science in Liverpool.—A private meeting held last week in the townhall, Liverpool, under the presidency of the mayor, is interesting, as showing that there is really a scientific feeling in that great commercial emporium. The meeting, though very unpretentious, is expected to result in considerable benefit to the town, where science has too long been almost ignored. The object is to induce visits from the greatest scientific lecturers; and a guarantee fund has been established to secure the managing committee against loss. The presidents of all the local learned societies have given in their adherence to the scheme, and attached their names to the list of guarantors. Altogether the Liverpool Science Lecture Association wears an appearance of reality that promises well for its success. The mayor evinced much interest in the subject, and the guarantors are nearly all gentlemen who may be relied upon for active aid.

Windsor Literary Institution. — Last week a lecture was delivered to the members of the above Institution by the Rev. H. F. Limpus, one of the minor canons of St. George's Chapel, the subject being "Architects and Architecture." The lecturer, in commencing, said he hoped they would not think he was sailing under false colours in announcing that he was going to address them on architecture and architects, and so leading them to expect that he was going to treat of the various styles of architecture,—such as the Ionic, the Italian, Gothic, Early English, and so on,—and on men who were eminent in that profession, for that was not his intention; but he was going to tell them of various animals, insects, and birds, who were not only the architects, but the constructors and builders of their own habitations. Misleading titles such as this should always be avoided.

The Reclaimed Land on the Thames Embankment.—The question as to the ownership of the reclaimed land on the Embankment claimed by the Crown, but disputed by the Metropolitan Board of Works, is likely, it would seem, to be amicably settled. After demanding 40,000*l.* for the ground which the Board required to be preserved as an open space, the Government are now, through the Commissioners of Woods and Forests, willing to accept 3,000*l.*, subject to the Metropolitan Board (in the event of their obtaining an Act to enable them to acquire Northumberlannd House), permitting the Crown to build upon a portion of the estate so acquired, as well as upon a part of the Embankment their legal right to which is hardly disputed.

Metropolitan District Railway. — The report of the directors read at the half-yearly meeting of shareholders gave the total receipts at 99,642*l.*, being an increase of 21,799*l.* over the corresponding half of the previous year. The net profit on the half-year's working was 49,071*l.*, which enabled the Board to pay all liabilities, interest, &c., and carry a small balance to current revenue account. The number of passengers carried had been about one million and a half in excess of the previous half-year, and the receipts therefrom had been:—1st class, 2,000*l.*; 2nd class, 2,500*l.*; and 3rd class, 12,600*l.* An increased receipt of 21,700*l.* had been earned by an increase of only 7,360*l.* in the expenses.

Society of Lady Artists.—The exhibition (9, Conduit-street) will be opened to the public on Monday next. The private view will take place on (this) Saturday.

Mortality of Preston.—Mr. Radcliffe, of the medical department of the Local Government Board, has just given a statement from inquiries he has made into the increased mortality of Preston. During one particular period of the past year the death-rate in Preston was higher than in any other part of the kingdom. He has inspected the different localities in the town where the greatest number of deaths have occurred, and the result is that the unusual degree of mortality is owing to defective sewerage and vitiated air. But the principal cause he ascribed to an imperfect system of cleansing the ashpits, and intimated that the local board of health should take the scavenging into their own hands, and have the middens systematically emptied.

Archæological Discovery in South Wales. A few days ago, Mr. Howel Pugh, of Tyddynbach Farm, Llanfachreth, near Dolgelly, discovered a vault containing human remains in a field which he was preparing to plough. The field rises abruptly in the centre, like several other fields in the locality, and on this eminence stood a huge stone, which interfered with ploughing operations. Mr. Pugh therefore determined to remove it, and eventually the stone was dragged away by a team of horses. A deep hole was then found, and at the bottom of it very dark earth mixed with stones. It was also discovered that there was probably a cavity lower down, and a little excavation revealed a stone vault, containing human remains, a brass dagger, and a gold ring.

Earthquakes.—The attention of men of science is beginning at last to be drawn to the remarkable frequency of the occurrence of earthquakes in divers places throughout the earth's crust. Mr. R. Mallet, F.R.S., in his introduction to a translation of Professor Palmieri's account of the eruption of Vesuvius last year, says that "if we were possessed of a sufficient report from all parts of our globe, we should probably find scarcely a day pass without a very sensible earthquake occurring somewhere; whilst, as regards still smaller tremors, it might almost be said that our globe, as a whole, is scarcely ever free from them." Moreover, "we may expect at present one great earthquake about every eight months."

Serious Explosion of Gas.—A gas explosion recently took place on the premises of Mr. Jay, Stafford-street, Walsall, by which parts of the partition walls were blown into the next house; six doors smashed, some of them being carried away bodily; shop windows and other windows blown out, and the property generally shattered, besides much furniture being destroyed. The accident was occasioned by a gasfitter having left the supply-pipe in a room insecure or unplugged. The gas found its way into the room above; and a gasman, who had been sent for, applied a lighted candle to the hole through which the pipe passed up.

The Tramway-Scavenge System.—It is proposed that our tramway service should be utilised during the small hours of the morning, or immediately after the passenger traffic ceases, for the purpose of conveying the scavenge and other rubbish of the City to suitable depôts or "shoots" outside the metropolis, and in several places where the tramway service exists the Local Boards are making their arrangements for availing themselves of this expeditious service. It is reported that all the chief towns and cities in Great Britain, through their public boards, will immediately follow suit, believing the system to be a simple, expeditious, and economical one. The idea is a good one.

Architects on the Stage.—Friday evening, the 21st of February, at the Architectural Association, was occupied with the members' *soirée*, with amateurs in farces, divers kinds of music, and a good muster of sociable members. The dramas were voted successful when the audience could not help laughing, and the end of "The Goose with the Golden Eggs" brought all the performers before the curtain. The programme, with the usual enigmas, looked, perhaps, a little late in the day; most of the vagarious architectural doings being by this time where are the *neiges d'antan;* but of course with dry filling old printed matter will make good new squibs.

Cleansing Carriage-ways. — Mr. William Haywood has made a valuable report to the City Commissioners of Sewers upon the results of experiments in cleansing the carriage-ways of main streets. We will give the pith of it on another occasion.

Another Bridge broken down by a Traction-engine.—A fatal accident has occurred at the hamlet of Broom, in the parish of Southill, near Biggleswade, according to the *Bedfordshire Times*, which states that a traction-engine of 10 or 12 tons weight, broke down a bridge of five skeleton iron girders, erected about fifty years since over a bye stream of the river Ivel, 2 ft. deep. One man, whose leg was caught under the machinery, but not broken, died of exposure to cold, as he could not be extricated for some time, and declined to have his leg amputated. Another traction-engine had passed safely on a previous occasion.

Stone in Yorkshire.—The stone trade in Yorkshire is still increasing, and the quarrymen are again agitating for a further advance in wages. Mr. Stephen Seal, of the Darfield quarries, conceded a further rise on the 20th ult. The price of stone, though higher, has not been advanced, we understand, in proportion to the increased rate of wages; and considering the enormous advance in coal, iron, and steel, the position of quarry proprietors is not an enviable one. An advance in price and the stoppage of some saw-mills are predicted.

The Late Mr. George Shalders.—A committee of artists has been formed for the purpose of making some provision for the family of the late Mr. George Shalders, member of the Institute of Painters in Water-colours. In addition to subscriptions, the committee are now forming a collection of drawings and sketches in oil and water-colours, to be afterwards disposed of for the fund. Mr. J. H. Mole, of 7, Guildford-place, Russell-square, W.C., is the treasurer; and the Bloomsbury branch of the London and Westminster Bank receives subscriptions.

The Age of Wood.—A discovery was made by Mr. John Glasbrook, in an old adit level, at Pwllycwm Colliery, near Landore. The men are sinking a new pit there, and in an old adit level, filled with rubbish, came across two old wooden shovels, evidently used by the miners hundreds of years ago. The handles of these shovels are of ash, the blades of oak (still as hard as steel). There is not a particle of iron even in the fastenings, and those implements of trade must have been left where now found at least 200 years ago.

Science in Daily Life.—The last but one of the present series of lectures on the application of science to the requirements of daily life, organised by Mr. Thomas Twining, in connexion with the late Economic Museum at Twickenham, and lately delivered on alternate Tuesday evenings, at the Lambeth Baths, was given on Tuesday last, when the subject was the important but much neglected one of "the human body."—*South London Chronicle.*

Heating Buildings.—An invention of Mr. W. G. Lankester has been tried in the New Guildhall, Winchester. It consists of cast-iron rectangular hollow chambers forming the skirting of the room. The heated water passes through these, as it does through ordinary pipes. The patent hot-water skirtings, however, appear just like wood skirting, and are therefore practically invisible, and they afford an opportunity for the introduction and warming of pure air at the back.

Design for a Desk.—At the last meeting of the Metropolitan School Board, on the motion of Mr. McGregor, chairman of the School Management Committee, it was agreed to empower that committee to offer a prize of 10*l.* for the best design for a desk and bench of the description recommended in the report.

Literary Dinners.—The Right Hon. W. E. Gladstone has accepted an invitation to preside at the anniversary dinner of the Royal Literary Fund on Wednesday, the 28th of May next. The annual festival in aid of the Newspaper Press Fund will be presided over by Mr. Froude.

Oxford Architectural and Historical Society.—The Saturday walks and excursions will be continued, commencing March 1, at 2.15 p.m. (Oriel College and St. Mary Hall); and on March 8, a visit will be paid to Lincoln College and All Saints' Church.

Oil for the Lighthouses.—The Honourable Corporation of Trinity House have accepted the tender of Sir W. A. Rose & Co., of London, for no less than 75,000 gallons of colza oil for the English and colonial lighthouses.

Pictures and Sketches.—We would remind our readers that a sale of the late Mr. Thomas Allom's pictures, drawings, and sketches will take place at the rooms of Messrs. Christie, Manson, & Woods, on March 14th.

Mr. Cole, C.B.—It is said that Mr. H. Cole, C.B., of the South Kensington Museum, has accepted the presidency of the Birmingham School of Art.

TENDERS

For six houses, with shops, on the Torrington Gardens estate, Finchley. Mr. M. C. W. Horne, architect:—

Walton	£5,229 0 0
Gilmour	4,980 0 0
Carter	4,920 0 0
Thompson & Smith	4,877 0 0
Wagner	4,784 0 0
Cooper	4,775 0 0
Niblett & Son	4,580 0 0

For rebuilding the premises, Nos. 13 and 15, King-street, Hammersmith, for Mr. Charles Bown. Quantities supplied by Messrs. Welsh & Atkinson. Mr. E. Woodthorpe, architect:—

Macey	£3,527 0 0
Braithwaite	3,450 0 0
Hill & Sons (too late)	3,370 0 0
Perry, Brothers	3,300 0 0
Colls & Sons	3,214 0 0
Turners & Sons	3,163 0 0
Downs & Co.	3,160 0 0
Pritchard	3,147 0 0
Chamberlen, Brothers	3,047 0 0
Adamson & Sons (accepted)	2,994 0 0

For Messrs. Mabey's offices, Throgmorton-street. Mr. John J. Cole, architect. Quantities supplied by Mr. James Barnett:—

Hill & Sons	£13,640 0 0
Ashby & Sons	12,150 0 0
Henshaw & Co.	11,900 0 0
Parry & Co.	11,500 0 0
Killby	11,189 0 0

For warehouse, Bishop-street, Stockton-on-Tees, for Messrs. W. Benington & Son. Messrs. Alexander & Henman, architects:—

Craggs	£550 0 0
Cook	479 0 0
Hey & Sons (accepted)	440 0 0

For schools (to accommodate 1,000 children), master's and mistress's houses, boundary-walls, &c., in Denmark-street, Middlesborough, for the Middlesborough School Board. Messrs. Alexander & Henman, architects:—

Adamson	£8,785 0 0!
Bellerby	6,169 0 0
Oliver	5,854 12 1
Johnson	5,623 0 0
Shaftoe & Barry	5,432 0 0
Stainsby	5,333 0 0
I. Johnson (accepted)	5,216 0 0
Bulmer & Co.	3,884 0 0!

For a new bank at Dover, for the London and County Banking Company. Mr. Fred. Chancellor, architect. Quantities by Mr. Sydney Young:—

Rider & Son	£4,794 0 0
Dove, Brothers	4,135 0 0
Stiff	4,124 0 0
Hill & Son	4,048 0 0
Denne	3,898 0 0
Adcock & Rees	3,853 10 0
Cooke & Greene	3,793 0 0
Wilson	3,732 0 0

For building a new bank, in Clement's-lane, City, for the Bank of British North America. Mr. Fred. Chancellor, architect. Quantities by Messrs. Hovenden, Heath, & Berridge:—

Brass	£11,530 0 0
Brown & Robinson	10,060 0 0
Conder	9,950 0 0
Hill & Sons	9,820 0 0
Perry & Co.	8,965 0 0

For building new schools, at Great Baddow, Essex. Mr. Fred. Chancellor, architect. No quantities supplied:—

Gardner	£1,433 0 0
Brown	1,415 0 0
Saunders	1,415 0 0
Gozzett	1,365 0 0

For building a chapel, in Heaton-road, Peckham-rye. Messrs. W. Berryman & Son, architects:—

Ray	£2,249 0 0!
Tarrant	1,449 0 0
Sawyer	1,394 0 0
Niblett & Son	1,390 0 0
Dewell	1,347 0 0
Brindley	1,298 0 0
Cook	1,258 0 0
Faulkner	1,248 0 0
Cooper	1,240 0 0
Marsland & Sons	1,229 0 0
G. & S. Fisher	1,197 0 0
Crowhurst	1,175 0 0
Shapley	1,135 0 0
Munday	1,080 0 0!

For building new schools, at Mayland, Essex. Mr Fred. Chancellor, architect. No quantities supplied:—

Stammers	£975 0 0
Saunders	965 0 0
Gozzest	825 0 0

For the erection of a cottage residence, at Caple-le-Ferne, near Folkestone, Kent. Mr. S. Slingsby-Stallwood, architect:—

Holdom	£610 0 0
Prebble	594 0 0
Brooks & Slade	564 0 0
Gore	520 0 0
Pain	499 10 0
Webster (accepted)	488 0 0

For roads and sewers, on Great Medgbury, close to New Swindon, Wilts. Mr. W. Read, surveyor:—
Contract No. 1.

Barnes	£356 0 0
Wiltshire	343 8 0
Phillips (accepted)	338 0 0

For the erection of a dwelling-house, at Portmadoc, for Capt. Hugh Jones. Messrs. Roberts & Morrow, architects:—

Humphreys	£300 0 0
R. Griffith	282 0 0
Lloyd	280 0 0
Roberts	279 0 0
Hughes	275 0 0
O. Griffith	274 0 0
Pritchard	273 0 0
Davies (accepted)	270 0 0
Williams	261 0 0

For the erection of a dwelling-house, at Portmadoc, for Mr. Ellis Williams. Messrs. Roberts & Morrow, architects:—

Humphreys	£210 0 0
Roberts	191 0 0
O. Griffith (accepted)	184 0 0
R. Griffith	183 0 0
Pritchard	166 0 0
Davies	161 0 0
Williams	154 0 0

For the erection of a mansion (irrespective of decorations), at Oldway, near Torquay, Devon, for Mr. J. M. Singer. Mr. Geo. Soudon Bridgman, architect. Quantities supplied:—

Goss	£16,300 0 0
Evans, Brothers	15,900 0 0
Lethbridge	15,484 0 0
Pethic	15,290 0 0
Finch	14,974 0 0
Hubbard	13,685 0 0
Matcham (accepted)	13,586 0 0

For new schools, Eagle-court, Clerkenwell, for th London School Board. Mr. E. R. Robson, architect:—

Wood	£6,667 0 0
Conder	6,050 0 0
Hill & Sons	6,000 0 0
Dove, Brothers	5,955 0 0
Scrivener & White	5,900 0 0
Tarrant	5,891 0 0
Grover	5,875 0 0
Niblett & Son	5,762 0 0
High	5,495 0 0
Wigmore	4,825 0 0

For the erection of two warehouses, in Queen Victoria-street, E.C. Mr. John Wimble, architect:—

Patrick & Son	£1,789 0 0
Scrivener & White	1,762 0 0
Kilby	1,683 0 0
Ashby & Sons	1,668 0 0
Newman & Mann	1,646 0 0
Mortar	1,633 0 0
Falkner	1,527 0 0
W. & F. Croaker	1,497 0 0

For making and forming roads, and laying in pipe sewer to same, on Clapham Park Estate. Mr. W. R. Lacey, surveyor:—

Neal	£1,695 19 2
Chappell	1,400 0 0
Elsdon	1,315 0 0
Wigmore	1,250 0 0

For the erection of schools, at Sutton, Surrey. Messrs Henry Jarvis & Son, architects:—

Kent	£1,696 0 0
Thompson	1,634 0 0
Richardson	1,630 0 0
Henshaw & Co.	1,592 0 0
Potter & Ferridge	1,576 0 0
Marsland & Sons	1,550 0 0
Shepherd	1,475 0 0

Accepted for road and sewer, Gipsy-hill:—

Bysh	£475 0 0

For the erection of two warehouses, in Queen Victoria-street, City. Mr. Alexander Peebles, architect. Quantities supplied:—

		Add, if Portland stone is used.
Bland	£10,168	£669
Morsman	9,610	670
Fish	9,200	630
Moreland & Co.	9,077	775
Myers	9,010	579
Nightingale	8,940	595
Longmire & Burge	8,900	573
Wicks, Bangs, & Co.	8,873	580
Woodward	8,822	763
Scrivener & White	8,820	580
Ennor	8,775	686
Ramsay	8,743	569
Morter *	8,668	545

* Accepted, including stone.

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